Improving Security and Flexibility in Retirement: Full Technical Report

Retirement Income Working Party
London

Prepared by David Blake and Robert Hudson

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Copies of the full technical report can be downloaded in pdf format from the Pensions Institute website: www.bbk.ac.uk/res/pi/reports/Mar00.pdf

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Full Technical Report of the Retirement Income Working Party

Preface

In 1999, Dr Oonagh McDonald published a report, commissioned by AUTIF, entitled, 'Income in Retirement - Are Annuities the Answer?'. The report researched the history and background of annuities and was critical of the current state of the market and of the obligation to purchase an annuity. Philip Warland, Director General of AUTIF referred to it as a 'comprehensible and intelligible treatment of annuities'. However, as he added, 'this paper does not answer all the questions'.

The publication of that report led to the establishment of an independent Working Party of industry and pensions experts in June 1999. The Working Party met once a month until January 2000, and produced two reports, a full technical report and a summary report.

The purpose of these reports is to make a contribution to the public policy debate about how best to provide retirement income and to set out practical alternatives to the current regime.

Members of the Retirement Income Working Party

Chairman: Dr Oonagh McDonald CBE

Professor David Blake, Director, Pensions Institute, Birkbeck College, University of London
Billy Burrows, Prudential Annuities
Piers Currie and Scott Arnott, Aberdeen Asset Management
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Geoff Proctor, Association of Investment Trust Companies
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As chairman, I would like to thank all those who have contributed to the report, and especially Professor David Blake, Director of the Pensions Institute, Birkbeck College, University of London for providing much of the research and for drafting the report with the assistance of Robert Hudson, Fellow of the Institute of Actuaries, International Institute of Banking and Financial Services, University of Leeds.

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Further copies of the report can be downloaded in pdf format from the Pensions Institute website: www.bbk.ac.uk/res/pi/reports/Mar00.pdf

Executive Summary

Purpose of the Report

The Report aims to identify ways in which the current compulsion to take annuities by age 75 might be amended. It examines the current provision of retirement income for members of defined contribution pension (DC) plans who are obliged to purchase such annuities, regardless of personal circumstances. It also looks at the shortcomings of existing annuities.

Main Proposals

The Report presents four main proposals:

1. An individual would continue to be free to take a tax-free lump sum from their pension fund subject to the current limits.
2. When someone retires, they must purchase an index-linked annuity to meet a Minimum Retirement Income (MRI)
3. There should be much greater freedom over the application of any Residual Fund after the Minimum Retirement Income is achieved
4. The current shortcomings of existing annuities should be reduced by government and the financial services industry

Whilst some questions still remain we, the members of the Working Party, believe that the report considerably develops the debate around retirement income.

1 Minimum Retirement Income

The concept of MRI is based on the following simple principle:

On retirement, an individual's only obligation (assuming sufficient funds exist) should be ensure an income that, taking into account life expectancy and inflation, will keep the individual above state support for the rest of their life.

There should only be an obligation to purchase an annuity from a DC pension plan if individuals are not able to fund the MRI from other sources. In 1999/2000 the MRI would be set at around £140.00 per week (equivalent to a Basic State Pension and a SERPS pension for an individual on National Average Earnings).

2 Residual Fund

Having met the MRI individuals would be free to use any Residual Fund in their pension plan. The Report proposes that individuals may as now draw up to 25% of the original pension fund (pre-MRI) tax free. Remaining assets would be then allowed to grow on a tax deferred basis, until withdrawn when they would be subject to the individual's highest marginal rate of income tax.

3 Existing Shortcomings of the Annuity Market

Once MRI is accepted then more innovative ways of providing for further income in retirement from pension plans can be found – not simply based upon annuities.

4 Conclusions

There are no simple answers to the present problems associated with providing income in retirement. Individuals are different and have differing requirements. This Report offers ideas and solutions to provide individuals with both choice and flexibility whilst ensuring they do not fall back on State benefits. Our aim is to open the public debate on these issues.

Improving Security and Flexibility in Retirement

1. Introduction

This Report arises from an earlier study by McDonald (1999) which was one of the first studies to question the value for money from purchasing annuities in a regime of low nominal interest rates. The present Report investigates the current system in the United Kingdom of retirement income provision of those members of pension plans who are obliged to purchase life annuities by the age of 75 at the latest. It assesses the obligation to purchase annuities regardless of personal circumstances and discusses some of the shortcomings of both existing annuity products and the regulations relating to these products.

The Report makes a number of recommendations. In particular, the Report: (1) **proposes** that, individuals should be allowed to keep the 25% tax-free lump sum when they retire (2) **proposes** that, on the individual's chosen retirement date, life annuities should be purchased only to a level necessary to meet, taking into account all other sources of life-long income (including the Basic State Pension), a Minimum Retirement Income that is increased over time in line with increases in the Retail Price Index for the remaining life of the annuitant, (3) **proposes** that there should be much greater freedom in the application of any Residual Fund (above that needed to meet this MRI), and (4) **proposes** that the design of annuities and other retirement products should be improved by identifying ways in which the shortcomings of existing products and their associated regulations can be reduced or eliminated by appropriate measures taken by both government and the financial services industry.

2. Annuities and Other Sources of Retirement Income Provision

The first step in the analysis is to specify the objectives of a pension plan and to examine how annuities and other forms of retirement income provision meet these objectives.

2.1 Purpose of a pension plan

The primary objectives of a pension plan are to:

> *Provide adequate retirement income security for the remaining life of the pensioner and his or her dependants,*

and

> *Eliminate the risk that the pensioner outlives his or her resources.*

This implies that the primary purpose of a pension plan is to fund for income rather than capital, since *only* an income stream satisfying certain conditions (in particular that it is life long and protected from inflation) can guarantee to meet these objectives. In some ways, this concept only partly meets the needs of those approaching retirement, given the availability of different assets outside formal pension plans, the changing patterns of work, longevity, lifestyle and the switch to personal responsibility implicit in the growth in defined contribution pension plans.

2.2 Annuities

A life annuity is a financial contract that provides regular income to the annuity purchaser for his or her remaining life. The different types of annuities commonly sold are explained in Appendix A to this Report.

Currently, for the vast majority of those members of defined contribution (DC) pension plans[1] reaching retirement, the purchase of a life annuity is ultimately the only option open to them[2]. This same obligation will apply to those who save for their retirement through the forthcoming stakeholder pension schemes. It is also imposed on those who make additional savings through additional voluntary contributions (AVCs) and free-standing additional voluntary contributions (FSAVCs).

At the same time, we should note that State pay-as-you-go (PAYG) plans[3] and occupational defined benefit (DB) plans[4] (such as final salary plans) also involve implicit life annuities. With individually arranged pension plans (such as personal pension plans), the annuity must be purchased from an authorised life office; with occupational DC plans, the annuity can be provided directly by the plan itself.

Annuities are not a common financial product in many parts of the world, including most of continental Europe. Appendix B examines some key countries in which annuities are sold. The main finding is that there is generally no compulsion to purchase annuities with the proceeds from the pension fund. Some countries, such as the US and Australia, allow individuals considerable freedom of access to the proceeds of their fund once they retire. Another group of countries, including Chile, Singapore and (after recent reforms) Ireland, allow freedom of access to the proceeds once a minimum income or a minimum fund has been secured. The purchase of an annuity is often just one of a number of alternative arrangements for generating retirement income security.

2.3 Alternatives to annuities

There are currently few real alternatives to the purchase of an annuity during the retirement phase of DC pension plans. The two main ones are taking the accumulated pension fund in cash and income drawdown.

2.3.1 Taking the pension fund in cash

One possibility is for the accumulated fund to go to the pensioner as a cash sum on the retirement date, with the pensioner free to spend this or reinvest this as he or she wishes. In the UK, it is possible under current personal pension rules to take up to 25% of the accumulated fund as a tax-free lump sum.

2.3.2 Income drawdown

With income drawdown, the capital sum remains invested in a fund and individuals are permitted to draw an income from the fund until they reach the age of 75 at which time they must purchase an annuity. Income drawdown is unique to the UK.

Income drawdown was first introduced in the UK by the 1995 Finance Act, following an unprecedented fall in government bond yields and hence annuity rates during the 1990s. Gilt yields fell from a peak of 15.8% in 1981 to 4.4% in 1998, the lowest rate since the 1950s, before rising slightly to 4.9% in 1999. Following the 1995 Finance Act, individuals can delay purchasing an annuity until age 75, during which time they can draw an income from the fund that is between 35% and 100% of that available from a single-life level annuity. Tables for doing this are supplied by the Government Actuary, and the arrangements have to be reviewed triennially. If the individual dies before the annuity is purchased, the following choices are available: the individual's spouse can continue using the drawdown facility until age 75 and if he or she, in turn, dies before this age, the balance of the fund forms part of his or her estate; or the spouse can purchase a standard annuity; or the balance of the fund can be received as a lump sum, currently subject to a 35% capital charge.

Table 2.1 shows the size of the income drawdown market in the UK in comparison with the pension annuity market. By 1999, income drawdown accounted for 24% of the retirement income market: 16,000 income drawdown plans were sold at a cost of £1.893bn, while 239,000 pension annuity policies were sold at a cost of £5.945bn. Table 2.2 shows that pension annuity payments totalled £7.514bn in 1999, the bulk of which came from personal and occupational defined contribution pension plans. Table 2.3 shows that the vast majority of the compulsory purchase pension annuities sold in 1999 were non-profit annuities which include level annuities, index-linked annuities and escalating annuities. With-profit annuities accounted for 7% of the market in 1999, but is the fastest growing segment of the market and it is expected that 20% of all annuities sold by 2001 will be with-profit. Unit-linked annuities have a tiny share of the UK market unlike the US.

In 1999, the average size of the fund used to buy a compulsory purchase annuity was £30,000, while the average size of the fund used for income drawdown was £120,000. Table 2.4 shows the structure of retirement income products sold in 1999 to male and female customers of a typical life office. Male retirement income is substantially higher than female retirement income particularly in drawdown, although the average purchase

ages are just a year apart. Only a small proportion of customers take any form of escalation. Men are more likely than women to purchase joint-survivor annuities.

Table 2.1 Gross new premiums (£bn) for pension annuities and income drawdown							
	1993	*1994*	*1995*	*1996*	*1997*	*1998*	*1999*
Pension annuities	2.685	2.623	3.118	3.394	3.944	5.755	5.945
Income drawdown	-	-	-	1.125	1.573	1.808	1.893
Total	2.685	2.623	3.118	4.519	5.517	7.563	7.838

Source: Association of British Insurers

Table 2.2 Annuities in force in course of payment (£bn)							
	1993	*1994*	*1995*	*1996*	*1997*	*1998*	*1999*
Purchased life	0.979	1.001	0.942	0.829	0.806	0.801	0.780
Deferred pension	0.284	0.276	0.450	0.396	0.428	0.300	0.328
Personal pension	0.846	0.870	1.043	1.281	1.707	2.436	3.289
Occupational	1.878	2.104	2.309	2.599	2.747	2.915	3.117
Total	3.987	4.251	4.744	5.105	5.688	6.452	7.514

Source: Association of British Insurers

Table 2.3 Composition of compulsory purchase pension annuities market in 1999	
Type of annuity	*% of total market*
Non-profit	80
With profit	7
Unit-linked	1
Bulk buy-out deferred annuities	12
Total	100

Source: Estimates from Standard Life

Table 2.4 Retirement income products in 1999 by sex			
		Males	*Females*
Average payment per annum	Pension annuity	£2,687.11	£1,813.54
	Income drawdown	£9,199.63	£4,288.01
Average purchase age	Pension annuity	63.0 years	61.6 years
	Income drawdown	63.1 years	62.1 years
Purchaser sex	Pension annuity	52%	48%
	Income drawdown	70%	30%
Proportion with escalation	Pension annuity	16%	17%
	Income drawdown	6%	15%
Proportion of annuities with		45%	23%
spouse's benefits			

Source: Typical life office

Finally, Table 2.5 lists some key annuity rates for January 2000. As a result of inflationary expectations being well below 5%, RPI and LPI annuities offer the same initial income which is (depending on sex) 22-25% lower than the corresponding income on a level annuity. Unisex annuity rates give women nearly 10% more than standard rates, although the reduction for males is much less than this.

Table 2.5 Annuity rates for January 2000

		Standard (£)	*Unisex (£)*
Male aged 65	Level	4,291	
	Retail price indexed	3,341	3,296
	Limited price indexed	3,341	3,296
Female aged 65	Level	3,978	
	Retail price indexed	3,001	3,296
	Limited price indexed	3,001	3,296

Note: Purchase price of £50,000, guaranteed 5 years, monthly in advance

Source: Prudential Annuities

3 The Economic Arguments Favouring Annuities

Despite these alternatives to annuities, there are some compelling economic arguments that support the purchase of an annuity when someone retires.

The consumption expenditures of individuals are typically much less volatile than their income tends to be. This suggests that individuals attempt to smooth out their consumption over time. This conjecture has been formalised in the Life Cycle Hypothesis[5] which predicts that individuals will attempt to smooth out their consumption over their full lifetime. To do this they will need to build up assets during their working life by consuming less than their income whilst they are in work. These asset holdings are then gradually liquidated during their retirement to finance a standard of living that could not otherwise be supported from the resources typically available during retirement[6]. One formal way of accumulating these assets is through a pension plan. An informal way is through property: individuals might own a large home when they are in work, but move to a smaller home when they retire and live off the housing equity thereby released.

One key problem with the informal ways of running down assets during retirement is the uncertainty attached to the length of an individual's life: no one knows for sure how long they will live. Formal mechanisms for accumulating and then running down assets, such as pension plans, deal with this problem by using life annuities: payment streams that continue until the death of the plan member. Annuities are currently a key part of defined contribution pension plans, but have problems in incentivising new savers when annuity rates are low. Informal mechanisms for running down assets during retirement will, unless individuals are particularly prescient about the timing of their death, lead to

individuals running out of assets before they die or alternatively leave unspent assets that will form part of their estate.

Annuities are the *only* financial instrument capable of dealing with longevity risk, the uncertainty attached to the length of an individual's life. Several studies[7] have shown that, under conditions of perfect capital markets[8] and no bequest motive by individuals, it is optimal for individuals to annuitise *all* their wealth in retirement.

Yet very few individuals voluntarily choose to annuitise their discretionary wealth[9]. A number of explanations have been put forward for this. First, when individuals have a strong bequest motive, they will not want to annuitise all their wealth[10]. Second, when there is inflation uncertainty and capital markets are imperfect (so that indexed-linked annuities are not available, for example), then it is irrational for individuals to annuitise all their wealth, even if they have no bequest motive[11]. Third, annuities might be poor value for money given the risks that they hedge[12]. In other words, the implied rate of return on life annuities as a result of life office loads might be much lower than on alternative investments, taking into account the life-long income guarantee that they offer. Nevertheless, insurance loads would have to be substantial before it became optimal not to annuitise and to accept the longevity risk[13].

In occupational defined benefit and State pay-as-you-go pension plans, individuals are usually not given the choice as to whether they annuitise their accumulated pension assets[14] or not (with the exception of certain commutation rights whereby retirees can commute part of their pension in the form of a cash lump sum). The same used to be the case with defined contribution plans in the UK, but since 1995, members of personal pension plans have been able to delay the purchase of an annuity until age 75.

It is arguable that, if high insurance loads are sufficiently high, it may be optimal to defer full annuitisation and invest the accumulated assets in higher yielding (if also riskier) investments until it is no longer possible to beat the mortality-adjusted rate of return from a life annuity, so long as a minimum consumption stream can be secured in the meantime[15].

4. Should Pensioners be Obliged to Purchase Annuities or Should Some Other Choice be Available?

Despite these powerful economic arguments favouring the purchase of annuities, there are a range of problems with annuities. However, there are also problems with the alternatives to annuities. We discuss these in turn.

4.1 Problems with annuities

4.1.1 Public perception of annuities

For some, perhaps increasing, numbers of people, the purchase of an annuity on retirement no longer appears to be an attractive option. Why is it that people are increasingly unwilling to buy an annuity when they retire? A number of factors must be considered.

First, annuity rates are currently very low by historical standards. Rates can reasonably be expected to be higher at some date in the future (although so can inflation). Second, lives are changing - and continue to change in retirement. Perhaps some part-time work is undertaken, family circumstances change or greater help is needed in later years either in one's own home or elsewhere. Third, as people continue to retire early, often in their 50s, a retirement period of probably 30 years stretches in front of them. It therefore seems premature to purchase a product which, once bought, cannot be changed. Further, the longer the anticipated retirement period, the lower the annuity will be for a given lump sum. At times of low nominal interest rates, the lump sum accumulated does not generate a very high annuity. Finally, despite the wish by pensioners for retirement income security, most individuals appear to be reluctant to convert capital into income if the balance of capital is lost when the individual dies. This is precisely what happens when someone purchases a single life annuity[16].

For all these reasons, greater flexibility is required to balance against the security which an annuity offers.

4.1.2 Highly concentrated provision

Even in economies with well-developed annuity markets, the market for immediate annuities is highly concentrated. For example, of around 240 authorised life offices in the UK, virtually the entire annuity market is supplied by just 20 firms, with the top five life offices accounting for more than 50% of the market[17]. Life offices themselves regard the annuities market as highly competitive.

4.1.3 Adverse selection and longevity risk

For those who are able to purchase annuities on a voluntary basis there is an element of self selection, since those who believe they are most likely to live longer than the average for the population of the same age will tend to purchase the annuity. However, most annuities sold in the UK relate to pension plans and, on the basis of current pensions legislation, the provision of an annuity becomes compulsory (at age 75), so it could be argued that currently most annuities in the UK are not bought on a voluntary basis.

Insurance companies base the mortality assumption used in pricing annuities on the past experience of those taking out each type of annuity contract. So for pension annuity business, this will reflect the general experience of those who have pension funds requiring them to take an annuity. Within that group there may be a sub-group who retire through ill health and so have much heavier prospective mortality than the group as a whole. Currently there is only a limited ability for such people to get better terms. However, it should be recognised that if the market as a whole were to offer them better terms then the counter balance to this is that others would get worse terms.

4.1.4 Underestimating increases in longevity

Possibly the biggest single risk that insurance companies face in writing annuity business is that they will underestimate the future improvement in longevity (see Table 4.1). The assumptions made in pricing annuities do make allowance for a best estimate of what future rates of improvement in longevity might be. However, the past few years have shown this to be a very difficult exercise to get right and most life offices would believe that the last few years have seen longevity improvements at a faster rate than they had anticipated within their pricing of annuities. In fact, longevity forecast errors of up to 20% over intervals as short as 10 years are not uncommon and some insurance companies in the UK have underestimated the average life expectancy of their pool of annuitants by up to two years[18]. Insurance companies add margins to cover these risks[19] (see Appendix C).

Table 4.1 Improvements in Average Life Expectancy over Time.		
1980 - 1982	Male aged 60	16.38
	Male aged 65	13.04
	Female aged 60	20.89
	Female aged 65	16.98
1990 - 1992	Male aged 60	17.85
	Male aged 65	14.27
	Female aged 60	22.08
	Female aged65	18.11
1998	Male aged 60	20.6
	Male aged 65	16.4
	Female aged 60	24.8
	Female aged 65	20.0

Source: English Life Tables/Government Actuary

4.1.5 Inflation risk

The risk faced by those purchasing level annuities, that unanticipated high inflation rapidly reduces the real value of the pension.

4.1.6 Interest rate risk

Annuity rates vary substantially over the interest rate cycle. They are related to the yields on government bonds of the same expected term; and since these yields vary by up to 150% over the cycle, annuity rates will vary by the same order of magnitude[20].

4.1.7 Reinvestment (or mismatch) risk

The risk faced by annuity providers that there are insufficient suitable long-maturing matching assets available to make the annuity payments, with the consequence that the proceeds from maturing assets may have to be reinvested on less favourable terms or in less suitable assets.

4.1.8 Inflexible annuity regulations

The development of more flexible products, more able to cope with the wide variations in annuitants' needs outlined above, is still hampered by legislation, specifically the Income and Corporation Taxes Act 1988. Designs which might be useful but are not currently permissible include the following.

Example 1

A 65-year old woman lives with her twin sister. She seeks an income in retirement which will continue to be paid to her sister after her death. Again, the annuity must increase in line with prices. Currently, legislation does not allow the purchase of joint life annuities for unmarried individuals who are not financially dependent on each other.

Example 2

A 65-year old man is concerned that an annuity might not be best value for money for him. He is worried that if he dies in the near future, he will not have had good value from the annuity. He could purchase an annuity which, on death, returns the excess of the purchase price over the payments he has already received. Again, the annuity must increase in line with prices. The purchase of such 'capital protected' annuities from pension funds is not permitted by current legislation.

Example 3

A 70-year old man retired at 65 with a level annuity, but has become concerned about inflation and would like to switch to an indexed annuity. Current legislation does not currently permit such a switch.

4.2 Problems with alternatives to annuities

4.2.1 Taking the pension fund in cash

If the accumulated fund is taken in cash, the pensioner now bears his or her own longevity risk and there is also the moral hazard risk of spending the cash too quickly and then going back to the State for help in the form of means-tested benefits: this is known as 'double dipping' in Australia.

Once in payment, annuities are taxed at the pensioner's highest marginal tax rate. This is in line with the key purpose of the pension plan which is to fund for income rather than capital. However, it is not clear that the tax breaks granted during the accumulation stage are justified if the primary purpose of the plan is to fund for capital, unless the capital sum is taxed at a rate that makes pension funding broadly tax neutral over the lifetime of the plan member.

4.2.2 Income drawdown

A number of important questions arise with income drawdown. First, annuity rates might actually be lower by the time the individual reaches 75. Second, the charges with income drawdown are much higher than for annuities due to the costs of advice, ongoing monitoring of the plan and the triennial review. Third, investment performance during the deferral period might be poor with the result that the fund falls in value. Fourth, by not buying an annuity, individuals forego a 'mortality cross-subsidy' (a cross-subsidy allowed for in annuity rates which arises because some annuitants will die shortly after taking out an annuity thereby releasing a 'mortality profit' which insurance companies share with longer-surviving annuitants): the mortality cross-subsidy is cumulative over time, and by delaying the purchase of an annuity, individuals experience a so-called 'mortality drag' (see Appendix D).

In short, income drawdown is a more expensive and potentially riskier product than an annuity and may therefore not be suitable for many pensioners, particularly those with low overall net worth or who have a low tolerance for risk[21].

4.3 How are annuities currently managed?

Insurance companies invest the premiums that are used to buy annuities in a variety of investments of a fixed-income type which generate cash flows that match as near is possible the required cash flows on the annuity. It is important that both the term of the investment and the degree or risk attached to default on the investment are taken into account in the pricing of annuities. The term of the investment is inversely related to the age of annuitant because the younger the annuitant the longer they are likely to live.

Insurance companies invest in a range of investments which would include not only standard fixed-income, government and corporate bonds, but also commercial mortgages, private finance initiatives and privately placed bond issues. Similarly, if the yields on equivalent bonds are higher in foreign markets, some insurance companies will buy bonds in these foreign markets and then use currency swaps to convert the coupon payments into the home currency. In choosing some of the latter investments, life companies are trying to improve on the yield they would get from government bonds even after allowing for the additional risk assumed. This is why the most competitive annuity rates quoted are significantly higher than implied by the yields on equivalent-term government bonds. In selling an RPI-linked annuity, the life company would look to match this against an RPI-linked bond of some type although sometimes alternative derivative based solutions may be available. Few insurance companies would take on the risk of selling indexed annuities with expected maturities beyond that of the most distant trading index-linked government bond.

Annuitants themselves remain exposed to interest and inflation risk. If a DC scheme member retires during an interest rate trough (as happened in the mid-1990s in the UK, for example), he or she can end up with what might be perceived to be a very low pension. Similarly, if a 65-year old male annuitant chooses an indexed annuity, he will receive an initial cash sum that is about 30% lower than that from a level annuity, and, with inflation at 3% p.a., it would take 11 years for the indexed annuity to exceed the level annuity and 19 years before the total cash payments are equalised. Since retired people also tend to underestimate how long they will continue to live, most prefer to buy a level annuity and thereby retain the inflation risk.

There is much confusion over the question of inflation. We often hear people say that the value for money of annuities has fallen just because annuity yields have fallen to their lowest level in 30 years. But this could be a sign of 'money illusion' which involves a confusion between the nominal value of a product and its real value as a consequence of a rapid change in the general level of prices (this is explained in more detail in Appendix E).

Also if the pricing of both level and indexed annuities are actuarially fair and if the longevity and inflation assumptions built into these prices are realised in full, then the two types of annuities have equivalent values and only the timing of the real value of the payments differs[22]. With level annuities, the real value is concentrated at the start of the policy, whereas with an indexed annuity the real value is spread evenly over the life of the policy. Some annuitants may prefer to have the real value of their retirement income concentrated at the beginning of their retirement period, while others may not. Only if there is unanticipated inflation or an unanticipated increase in life expectancy will it be the case that the indexed annuity turns out to provide better value for money than the level annuity. But we should be clear how this happens: unanticipated inflation involves an unplanned transfer from the government (as issuer of the indexed bond backing the indexed annuity) to the annuitant, while an unanticipated increase in life expectancy

involves an unplanned transfer from the annuity provider's reserves to the long-living annuitant. The greater these two risks, the greater the inflation and longevity risk premia that have to be built into the pricing of indexed annuities. These risk premia compensate for the difficulties of forecasting inflation and longevity in the distant future. But nevertheless, in an efficient annuities market, having adjusted for these risks, the two types of annuities will have equivalent values: as always there are no free lunches around! (see again Appendix D).

The outcome is that insurance companies use the financial markets to hedge the interest and inflation rate risks that they face from the date that the annuity is purchased.

Interest rate risk up until the date of retirement is borne by the future annuitant, and inflation risk after the retirement date is also borne by the annuitant unless he or she is willing to forego a substantial cash sum at the start of retirement as a consequence of purchasing an indexed annuity.

Longevity risk is covered by the price that new annuitants pay. However, the risk associated with underestimating increases in longevity falls entirely on the insurance company providing the annuity: in consequence there are times when insurance companies lose money on their annuity business.

5. Proposal: Members of Defined Contribution Pension Plans should be Required to Purchase an Annuity only up to a Level Necessary to Meet a Minimum Retirement Income at the Age of Retirement

In view of the two key conflicting issues with annuities outlined above, namely that they hedge longevity risk, but individuals are reluctant to give away capital, the Report considers ways in which flexibility can be improved without sacrificing security.

5.1 Definition of the Minimum Retirement Income

Recognising that the State has offered generous tax breaks to encourage individuals to build up assets for their retirement, the Report acknowledges that the State has two main concerns in respect of the distribution phase of the pension plan, namely that distributions are not made in a way that will lead to plan members falling back on the State for their retirement income at any stage during their retirement, and that the plan is broadly tax neutral over the member's life cycle, so that tax reliefs granted during the accumulation stage are recovered during the distribution stage.

The Report therefore **proposes**, as a minimum requirement, that for every individual with one or more defined contribution pension plans, the total funds from all these plans have to be used to purchase annuities only up to a level needed to provide (taking into account any Basic State Pension, any SERPS pension and any other private pension(s)) a

Minimum Retirement Income which is uprated annually in line with increases in the Retail Price Index for the remaining life of the individual.

This proposal is based on the following principle:

> *Recognising the Inland Revenue requirement that the purpose of a pension fund is to provide retirement income, an individual's only obligation on retirement (assuming sufficient assets in the pension fund) should be to take steps to guarantee an annual income that, taking into account life expectancy and inflation, will keep the individual above State support for the remainder of his or her life.*

Any other sources of income that satisfy the condition that they are subject to RPI uprating or better for the remaining life of the individual can count towards the MRI. Other sources of lifelong income that are not subject to RPI uprating can also count towards the MRI after an appropriate adjustment has been made. The difference between the MRI and the sum of all these other sources of income is denoted the Residual Income Requirement (RIR): this is the amount that needs to be annuitised from the DC pension fund.

The MRI becomes payable once an individual first decides that he or she wishes to draw a retirement income other than a State pension (irrespective of whether they have actually stopped working or reached State Pension Age) or by a stipulated maximum age. The age at which this occurs is denoted the MRI Start Age. The Report recognises that phased retirement is an increasing option and also that individuals may have a number of policies[23]. As individuals progressively withdraw from full-time work, they would be required to purchase RPI annuities up to the level of the MRI. There also has to be a maximum age for drawing the MRI to prevent the pension plan being used to evade taxation. The maximum age should be 75, the same as the current maximum age for drawing a pension annuity and should move in line with any changes in the latter.

If the Start Age is on or after State Pension Age, then the actual State pension benefits would be taken into account in the calculation of the RIR. If the Start Age is before State Pension Age, then a step-down annuity must be purchased. This is an annuity that will pay the MRI until State Pension Age, at which point it will fall to pay the RIR as State pension benefits begin to be drawn[24]. A two-step-down annuity can be purchased if the normal age for drawing a private pension falls between the Start Age and State Pension Age.

To meet the MRI, individuals would have to demonstrate to the Inland Revenue or DSS that the sum of their pension entitlements (both State and private), at the Start Age, will deliver the MRI for the remainder of their lives. If the assets in the pension fund are insufficient to meet the RIR, then the full amount of the pension fund must be annuitised at the Start Age. However, recognising the importance of the current entitlement to a 25%

tax-free lump sum, the Report accepts that this entitlement should take precedence over the requirement to meet the RIR, *even if this means that the MRI cannot be fully met as a consequence*.

The MRI is intended to provide an income stream that is inflation proof. Therefore different rules would apply depending on whether the income stream being used to meet (in whole or part) the MRI was index-linked or not. There would need to be some mechanism for comparing an index-linked pension (e.g. under a defined benefit plan) with one which is not, if this was being used to meet the MRI. Therefore, if a defined benefit plan was due to pay a pension that was not index-linked, the pension provider would be required to provide a calculation of an equivalent index-linked income for MRI purposes. This would be found by multiplying the flat rate pension by the ratio of the first payment from an indexed annuity to the first payment from a level annuity with the same purchase price. This would be purely for MRI calculation purposes: the pension provider would not be required to provide an index-linked pension in respect of this amount.

It might also be possible to use a level annuity for MRI purposes provided a suitable adjustment is made to cover the inflation risk: in other words, the level annuity would have to provide an income that exceeded the MRI by a specified margin. This proposal recognises the possibility that the demand for index-linked annuities to meet the MRI may outstrip the supply of index-linked bonds available on the market. This would have the effect of driving down index-linked annuity yields and make them very poor value for money.

Having demonstrated that the MRI had been met, the Inland Revenue or DSS would issue a certificate that the individual would pass to his or her pension provider(s) which would then allow the pension assets not used to meet the MRI to remain invested in a pension fund tax environment. Failure to obtain such a certificate (e.g. because pension entitlements and assets were not sufficient to meet the MRI) would mean that the individual would be compelled to use all pension assets (after deduction of the 25% tax-free lump sum) to purchase an RPI life annuity.

The simplest approach is that every individual should have to meet their own MRI. But there are a number of implications. The first arises from the rules governing spouse's benefits from both State and private pension schemes. For example, while most individuals now earn a BSP based on their own contributions, some married women are entitled to a BSP on the basis of their husband's contribution record at 60% of his rate; on their husband's death, they will obtain a full basic pension. With SERPS, married women will receive 50% of their husband's pension if he dies after April 2000. With occupational schemes, the spouse receives a maximum of two-thirds of the member's pension when the member dies. So the first implication of this recommendation is that should one of the spouses die, the surviving partner will end up receiving total pension amounts in excess of the MRI.

A second implication is that if one of the spouses has not built up sufficient assets to

meet the MRI, there would no requirement for the other spouse to make up the shortfall, thereby increasing the likelihood of the first spouse falling back on State benefits at some future stage. It would, of course, be possible for one spouse to elect to purchase a joint-survivor annuity covering the MRIs of both partners, but, under our proposals, there would be no obligation to do this. A third implication arises in the event of divorce: individuals would be required to meet the MRI *after* any pension splitting obligations have been taken into account.

The RPI life annuity would be taxable at the member's highest marginal rate of income tax and no benefit would pass on the member's death, unless a joint-survivor annuity had been purchased, in which case the benefit would cease on the spouse's death if this was after the member.

The Report **proposes** that, if mortality rates between men and women actually converge, the government might consider widening the use of unisex annuity rates to include the annuity needed to meet the RIR. There is some evidence that mortality rates for men and women are beginning to converge[25].

Finally, the Report considered as an alternative to the MRI the proposal introduced in the Irish Republic by the 1999 Finance Act to maintain a minimum lump sum in a pension account. The Report sees weaknesses in this proposal, since a lump sum that is capable of delivering a given life-long indexed income on one particular date may not, as a result of changes in asset values, annuity yields and mortality assumptions etc, be capable of delivering the same life-long indexed income at some date in the future.

5.2 Levels for the MRI

The Report considered three different levels for the MRI for an individual plan member:

1. The same level as the Minimum Income Guarantee (MIG). In 1999/2000, the MIG was £75 per week and the Basic State Pension was £66.75 per week, implying a RIR of £8.25 per week that needed to be funded from the pension fund (assuming no other eligible sources of income). The government plans for the BSP to rise in line with prices, while the MIG is planned to rise in line with earnings.

2. The best that can be achieved from combined membership of the Basic State Pension Scheme and the State Earnings Related Pension Scheme for a member on National Average Earnings (NAE), namely 20% of NAE in excess of the Lower Earnings Limit. This came to approximately £140 per week in 1999/2000[26].

3. The average that is achieved from combined membership of the Basic State Pension scheme and an occupational pension scheme. This came to about £220 per week in 1999/2000[27].

The Report **rejects** the first option on the grounds that (a) an MRI equal to the MIG would be too low to guarantee that the individual would always stay off State benefits, and (b) the excess over the BSP of £8.25 per week would grow very rapidly over time and in such a complex manner (which depended on both the price and earnings inflation rates) that no existing financial instrument is able to match it. The Report also **rejects** the third option on the grounds that this sum was higher than the financial contentment level of £193 per week that results of surveys conducted by National Westminster Life Assurance (1999) indicated provided a comfortable standard of living in retirement.

The Report therefore **recommends** the second option on the grounds that this is broadly the minimum that private sector pension plans must offer in order to contract out of SERPS. There is, of course, the danger that, if earnings growth is significantly greater than the rate of retail price inflation, the MIG will eventually exceed this level.

The Aberdeen Asset Management Retirement Income Survey provides evidence that about a quarter of current pensioners and those near retirement who have some pension entitlements involving the purchase of annuities are likely to have retirement income above the MRI if it is set at the level indicated in the second option (Appendix F).

If someone has entitlement to the full Basic State Pension, a Residual Income Requirement of around £70 per week would be needed to meet the Minimum Retirement Income in full in 1999/2000. This would require a fund of £55,100 for a 65-year old man and a fund of £62,200 for a 65-year old female retiring in January 2000.

5.3 Illustration

John Smith has had a variety of jobs over the years. He has been an employee all his working life but has not always had access to an occupational pension, although he was in a defined benefit scheme for a few years. He has always contracted out of SERPS. He is 65 and has decided to retire.

He has the following pension entitlements and assets:

- a Basic State Pension of £3,471
- a defined benefit entitlement of £1,000 (not index-linked)
- a personal pension plan with assets of £150,000

John's tax-free entitlement is 25% of the assets in the personal pension plan, i.e., £150,000. This gives a maximum tax-free lump sum of £150,000 x 25% = £37,500. He takes the full amount.

The MRI is set at £7,280 per annum. John begins by deducting the Basic State Pension from the MRI. This is appropriate as all State entitlements are guaranteed to rise in line

with price inflation:

	£
MRI	7,280
State pension	(3,471)
Difference	3,809

The next stage is to consider any pension entitlements which are life-long but are not indexed to inflation. John's defined benefit scheme will provide a fixed income of £1,000 a year. Suppose this is treated as equivalent to an index-linked income of £779. This is found by taking the ratio of £3341 (the first year's income from an RPI annuity for a 65-year old male as shown in Table 2.4 above) to £4291 (the annual income from a level annuity from the same table) and multiplying this ratio by £1000. John's MRI calculation now looks like:

	£
MRI	7,280
State Pension	(3,471)
Defined Benefit	(779)
RIR	3,030

John therefore has to a Residual Income Requirement of £3,030 which must be met from the assets in the personal pension plan. Suppose that the current market price of an RPI life annuity paying £3030 per annum is £45,866. John must therefore use £45,866 to purchase this annuity.

Having deducted the £37,500 tax-free lump sum and the £45,866 annuity purchase price from the £150,000 pension fund, John is left with £66,634 in the Residual Fund. Section 7 proposes that there should be much greater freedom than currently exists over how this sum might be applied.

6 Projecting the Level of Contributions Required to Provide a Minimum Retirement Income

We have undertaken some projections of the level of contributions into a DC pension plan needed to meet the Minimum Retirement Income level for someone who joins the plan in 2000 aged 25 and retires in 2040 aged 65. We have done this under two different sets of assumptions concerning investment returns. The first is that investment returns are deterministic (i.e., fixed) and the second is that investment returns are stochastic. The first case will allow us to determine the average contribution rate into the fund necessary to achieve the MRI from retirement age. The second case recognises that there is some uncertainty attached to investment returns and to the annuity rates available at retirement which will lead to a positive probability of the fund being insufficient to meet the MRI in full. We therefore also calculate the contribution rate needed to meet the MRI with a specified degree of confidence. (The full set of assumptions used in the projections is listed in Appendix G).

6.1 Target level for MRI

The target level for the MRI is, as specified in Section 5.2, the best that an individual on National Average Earnings (NAE) can achieve from membership of the combined State pension schemes (BSP and SERPS). In 1999/2000, this amounted to approximately £140 per week. If the individual is entitled to a full BSP, this leaves a RIR of about £70 per week to be provided by a second pension plan. Suppose that this second plan is a DC pension plan.

6.2 Contributions to meet the target level

6.2.1 Deterministic projections

Table 6.1 presents the deterministic projections. It shows that, on average, male contributions of £930 per year for 40 years are needed to generate a retirement income of £70 per week, in constant earnings terms, although by 2040, this will be equivalent to £127 per week in 2000 prices, since we are projecting that real earnings grow by 1.5% per annum. Female contributions, as a result of the greater longevity of women, average £1010 per annum or nearly 9% more than male contributions. However if unisex rates are used then male contributions rise by £40 per year and female contributions fall by the same amount. The RIR can be met with contributions equal to 4.7% of NAE.

Table 6.1 Deterministic projections of the required contributions		
Type of annuity	*Contribution needed to give an expected benefit equal to the target benefit (£ pa)*	*Contribution as a proportion of national average earnings (%)*
Male annuity rates	930	4.5
Female annuity rates	1010	4.9
Unisex annuity rates	970	4.7

Note: The projections assume the full Basic State Pension will also be paid

Calculations have also been carried out to find the expected pension resulting from contributions of £3,600 per annum: this represents the maximum contribution to a stakeholder pension plan (introduced by the Welfare Reform and Pensions Act (1999)) that does not depend on the level of salary earned during the year in which contributions are made and amounted to 18% of NAE in 2000. Table 6.2 shows that, using unisex annuity rates, a pension of £260 per week (equal to 68% of NAE in 2040) can be achieved on average.

Table 6.2 Deterministic projections for stakeholder pension plans		
Type of annuity	*Pension in constant earning terms based on a contribution of £3,600 pa (£ per week)*	*Pension as a proportion of national average earnings in 2040 (%)*
Male annuity rates	270	70
Female annuity rates	250	65
Unisex annuity rates	260	68

6.2.2 Stochastic projections

Table 6.3 shows that when investment returns and annuity rates are stochastic, a higher level of contributions is needed if the target pension is to be achieved with sufficient confidence. An useful analogy might be a high jump with a bar that moves randomly up and down. Much greater effort needs to be made to be fairly sure of clearing the randomly moving bar than would be needed in the case of a fixed bar, even if the moving bar has on average the same height as the fixed bar. The table shows that, with unisex annuity rates,

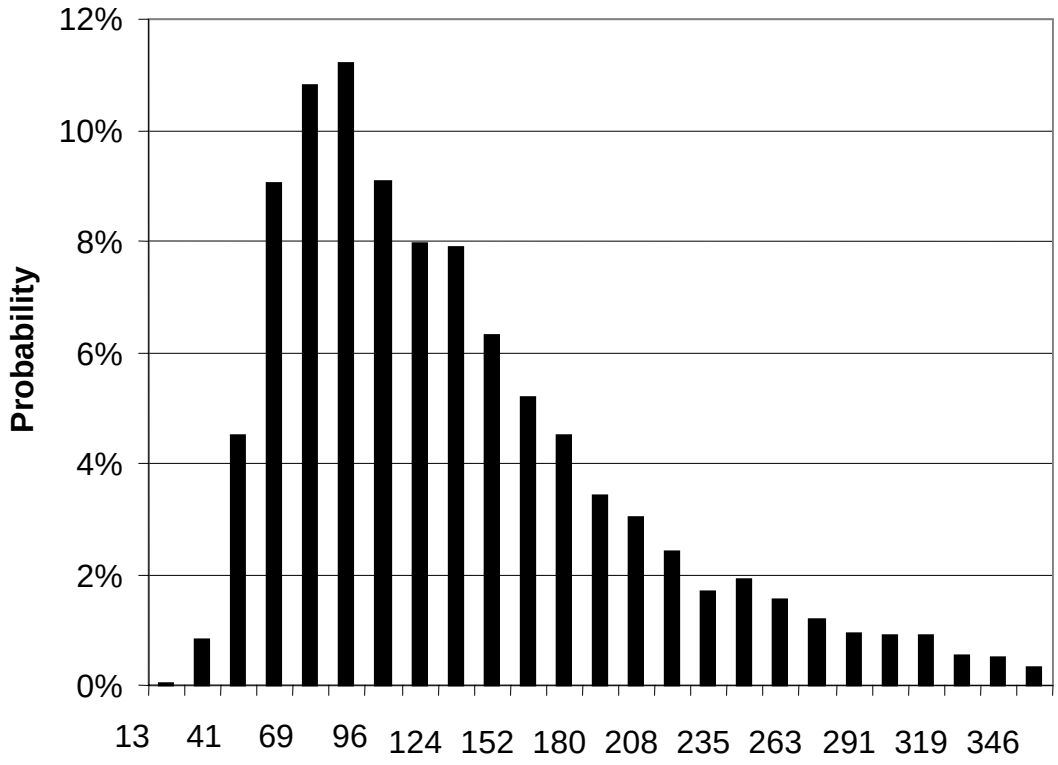
the annual contribution amount is £1730 if we are to be 75% confident of meeting the target pension and £2380 if we want to be 90% confident. These are, respectively, 78% and 145% higher than the deterministic case, indicating the importance of taking the risk of falling short of the target fully into account.

Table 6.3 Stochastic projections of the required contributions

	Contribution to give 75% chance of exceeding target benefit (£ pa)	*Proportion of national average earnings (%)*	*Contribution to give 90% chance of exceeding target benefit (£ pa)*	*Proportion of national average earnings (%)*
Male Annuity Rates	1590	7.6	2160	10.4
Female Annuity Rates	1860	8.9	2590	12.5
Unisex Annuity Rates	1730	8.3	2380	11.4

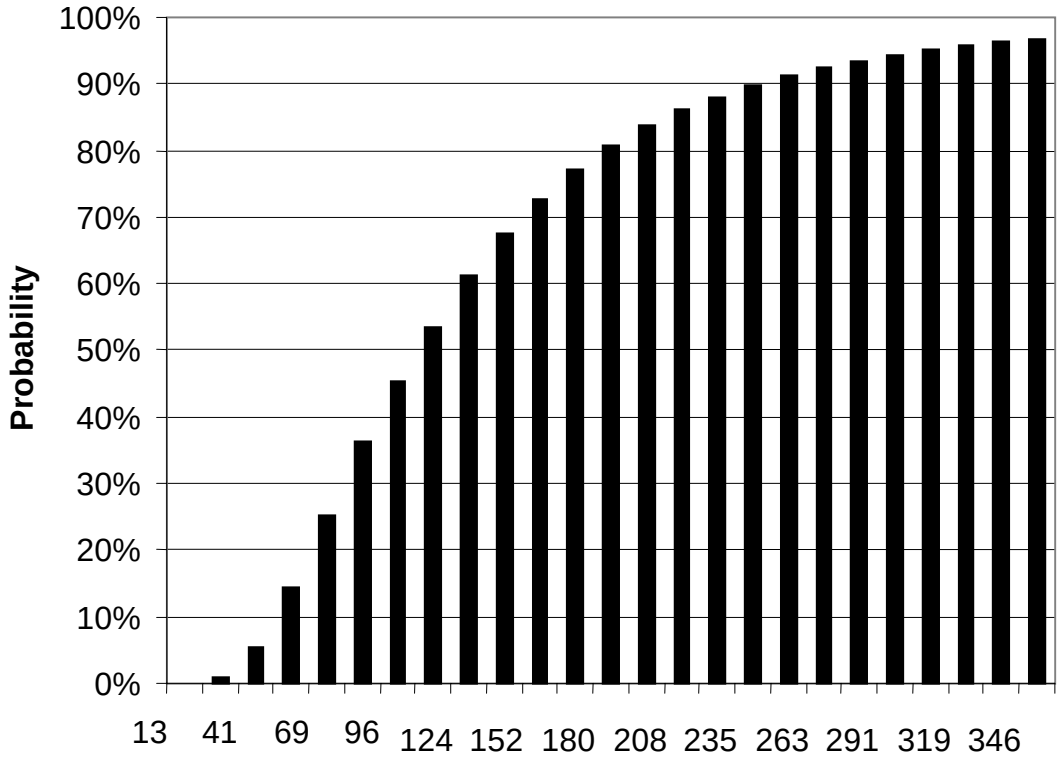
Figures 6.1 and 6.2 show the distribution of the outcomes from the stochastic model in the case where contributions of £970 per year are made and unisex annuity rates are used. This is the contribution amount needed on average to meet the target benefit (see Table 6.1). The range of outcomes varies from a pension of below £40 per week to one exceeding £300 per week.

Fig 6.1 Distribution of pension
(Unisex aged 65 in 2040)
[Stochastic real asset returns and annuity factors]



Weekly pension (£, 2000 prices). Target £127 pw equivalent to £70 pw in constant earnings terms

Fig. 6.2 Cumulative distribution of pension
(Unisex aged 65 in 2040)
[Stochastic real asset returns and annuity factors]



7 Proposal: There Should be Much Greater Freedom over the Use of the Residual Assets in the Pension Fund

The Report **proposes** that there should be much greater freedom in the use of the residual assets in the pension fund. The pension fund is used first to provide a tax-free lump sum of up to 25% and then to buy an RPI life annuity (or equivalent) to meet the MRI; individuals could, of course, purchase an annuity for more than the MRI assuming resources permit. Any remaining assets are denoted the Residual Fund and will continue to grow on the same tax-privileged basis as present.

7.1 Should there be any limits on the use of the Residual Fund?

Bearing in mind the objective of improving flexibility in the distribution phase, the Working Party considers that any of the following options for the application of the Residual Fund both permit greater freedom of choice and form the basis for a coherent tax system:

1. There should be no restrictions on the application of the Residual Fund, so that funds could be drawn at any time subject to income tax at the individual's highest marginal rate of tax.

2. There should be a minimum annual withdrawal, but no maximum.

3. There should be a maximum annual withdrawal, but no minimum.

4. There should be both a minimum and maximum annual withdrawal as with income drawdown.

5. Options 2, 3 and 4 plus a suitable capital charge on the Residual Fund (or on the full pension fund if the MRI had not already been drawn) at some future age (e.g. 75) unless it had been used in its entirety to purchase an annuity by this age.

Any withdrawals would be subject to income tax at the individual's highest marginal rate. Any Residual Fund remaining at the time of death would be subject to the same rules as currently exist for income drawdown, as outlined in Section 2.3.2 above. Individuals may wish to seek professional advice on the tax and investment implications of their decisions.

It was also felt that the Residual Fund should be excluded from the definition of exempted assets when it came to State assistance with Long Term Care.

The Report makes **no recommendation** as to which option should be adopted: the Working Party offers these options as a starting point for public debate.

7.2 How should the Residual Fund be invested?

While the assets remain invested, the Report **recommends** that they should continue to grow free from income or capital gains tax. The Report **proposes** that the rules relating to the investment of the Residual Fund should be harmonised with those of other savings and investment media.

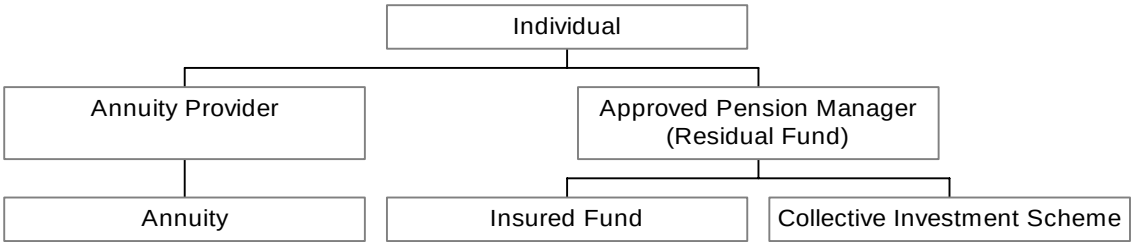
One possibility is that individuals choose to have their Residual Fund transferred to an Individual Retirement Account where the assets are managed in insured funds or in collective investment schemes, such as unit trusts, investment trusts, UCITS and OEICS.

Such a move would involve extending the PEP and ISA regime to allow authorisation of PEP and ISA managers as Approved Pension Managers. Such approval could be done on a similar basis to that authorising ISA managers. This would enable such managers to offer any defined contribution pension product. On reaching retirement, pensioners with residual assets would be permitted to hold investments as previously, or switch to another provider.

This flexible system could be combined with other tax-favoured savings vehicles, such as ISAs, to create a complete life cycle of savings products that will be seen as belonging to the individual. We believe that it could also provide appropriate incentives for individuals to participate in Stakeholder Pension Plans as well as encouraging new entrants and new product providers in this market.

The Approved Pension Manager would be subject to existing FSA conduct requirements and would effectively contract with each individual retiree. The manager would be required to prepare annual or bi-annual statements detailing reports and results. Retirees would be able to choose which manager they wish to manage their Residual Fund. The retiree could choose to place their entire retirement fund with a single annuity provider or they could choose to appoint an alternative Approved Pension Manager.

The diagram below illustrates how the structure would operate:



This new framework will allow investors, if they wish, to remain more fully invested in equity funds for longer than is currently the case. In the United States similar accounts, known as IRA rollover accounts are taxed on distribution from the age of 70 ½, following minimum annual distribution rules based on an annual recalculation of life expectancy of the individual or their beneficial. However, while the average return on the invested assets is likely to be greater initially than the implied return on the annuity, there is some risk that individuals may be worse off than if they had used the full Residual Fund to purchase an RPI annuity at the retirement age, especially when the charges for managing the investment assets are taken into account. We demonstrate this in the next Section.

8 Stochastic Modelling of Alternative Vehicles for Providing Income in Retirement

A variety of different alternatives to standard annuities have been proposed to provide an income in retirement. These alternatives are generally based on obtaining a substantial investment exposure to equities. A higher level of equity exposure will give rise to a higher expected investment return and, inter alia, a higher expected income than an annuity the income from which is based on the return on bonds. However, there is also an increased risk that is not readily appreciated by examining deterministic projections alone. There are also higher charges. We have performed some stochastic projections to illustrate the risk and returns which may be achieved by adopting some of the key alternatives. These are:

1. Income drawdown with annuity purchased at age 75

2. Income drawdown with deferred annuity purchased at retirement age and coming into effect at age 75[28]

3. Unit-linked annuity

4. Flexible unit-linked annuity

5. With-profit annuity.

The last three are the main examples of investment-linked annuities. In each case, the projections are applied to a male retiring aged 65 in 2040. For illustrative purposes unisex annuity rates have been assumed. The individual concerned is assumed to have a fund at retirement sufficient to purchase an RPI annuity that will be equal in size to the proposed MRI. We will examine the possible outcomes from each of the five alternatives at age 75 with that which would have obtained had he purchased an RPI annuity at age 65. (The full set of assumptions used in the projections is listed in Appendix H).

It is well known that the outcome from a retirement income vehicle that is primarily based on equity investment in comparison with that from purchasing an annuity will depend principally on the relative investment returns of equities and bonds. In addition to

the calculations based on the main assumptions, calculations have also been performed to determine the investment return required to give a 75% probability of the income payable from the equity-based vehicle exceeding the income that would be payable had an annuity been purchased at age 65. Individuals then have to take a view on whether they believe that such returns are sufficiently likely for them to better off by foregoing the purchase of an annuity.

8.1 Five vehicles for providing retirement income

8.1.1 Income drawdown with annuity purchased at age 75

In this case the individual transfers his retirement fund to a managed fund at age 65. He then withdraws an income each year equal to that which he would have obtained had he purchased an annuity at age 65 (if there are sufficient monies in his fund)[29]. At age 75 he uses his entire fund to purchase an annuity. We again point out that income drawdown is a very expensive product, with current charges much higher than the 1% we have allowed for in our stochastic simulations. Nevertheless, we adopt a 1% charge for the simulations on the expectation that the widespread use of CAT standards[30] with help to lower drawdown charges to this level.

Figs. 8.1 and 8.2 show, respectively, the distribution and cumulative distribution of the possible sizes of the annuity which could be purchased at age 75 as a proportion of the annuity payments he would have been receiving at age 75 had he bought an annuity on retirement at age 65. The figures show that the individual would be likely to do less well by taking the drawdown route, although there is a 27% chance that he will do better than the annuity if investment performance turns out to be strong. There is almost a 10% probability that his funds would be exhausted by age 75.

An investment return on the managed fund of approximately 9.5% pa in excess of RPI and expenses would be required to give a 75% probability of an individual adopting drawdown having an income at 75 in excess of that which could be achieved by purchasing an annuity at age 65.

8.1.2. Income drawdown with deferred annuity purchased at retirement age and coming into effect at age 75

In this case the individual purchases a deferred annuity at age 65 which will provide an income from age 75 equal to that which would be payable at that age from an immediate annuity bought at age 65. He invests the Residual Fund at age 65 in a managed fund. He then withdraws an income each year equal to that which he would have obtained had he purchased an annuity at age 65 (if there are sufficient monies in his managed fund). His income is secure from age 75 but he may exhaust his fund before then.

Fig. 8.1 Distribution of drawdown with annuity
(Unisex aged 75 in 2050)

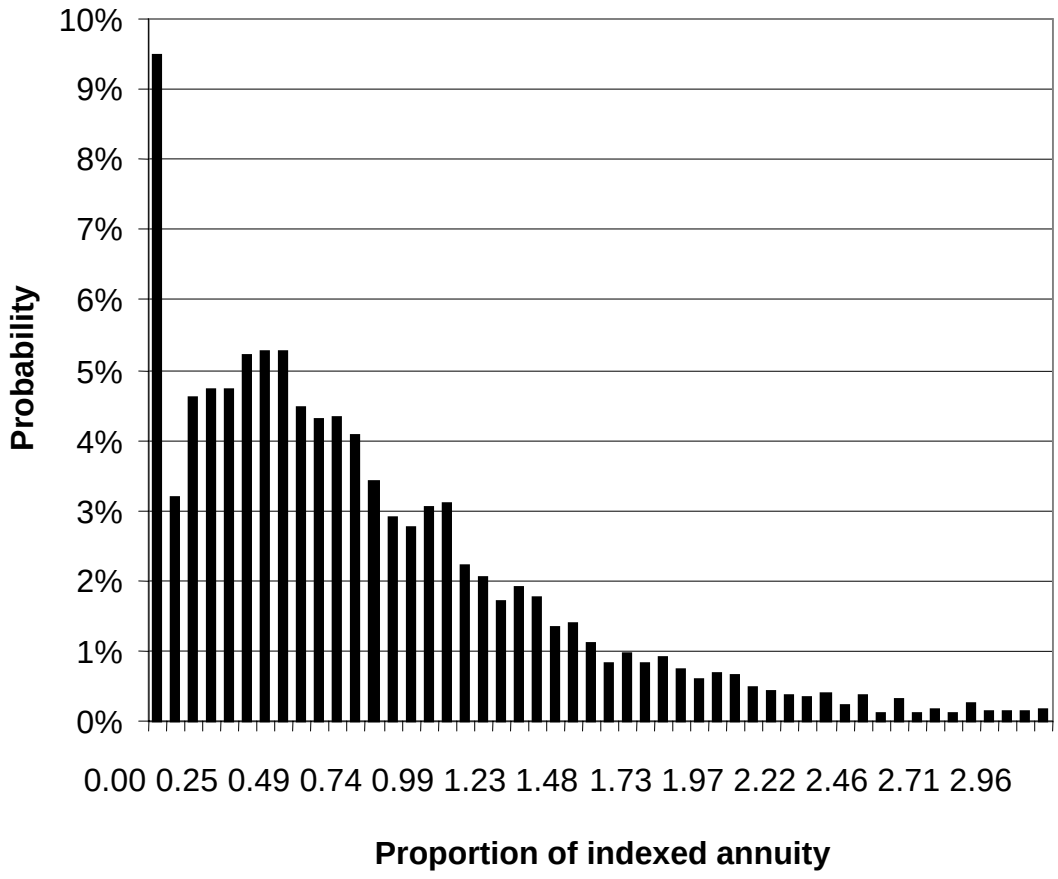


Fig. 8.2 Cumulative distribution of drawdown with annuity (Unisex aged 75 in 2050)

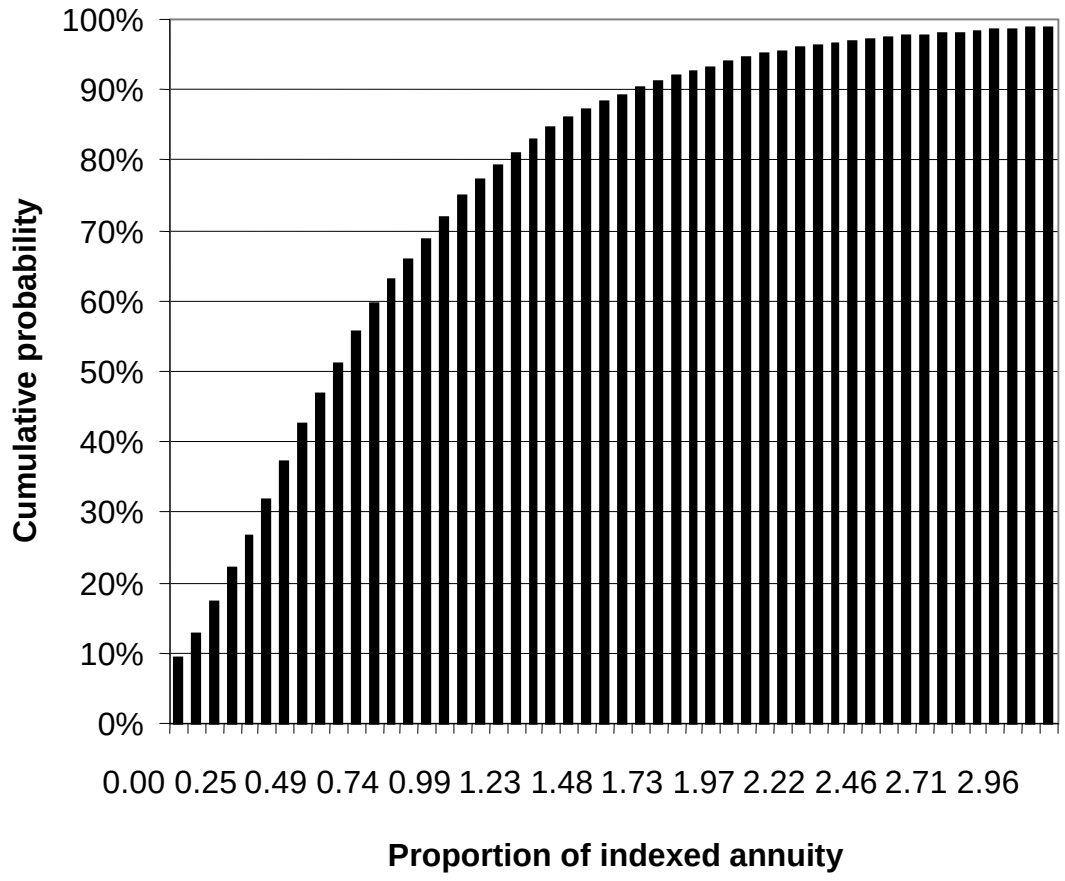


Fig. 8.3 Cumulative distribution of surplus fund after deferred annuity (Unisex aged 75 in 2050)

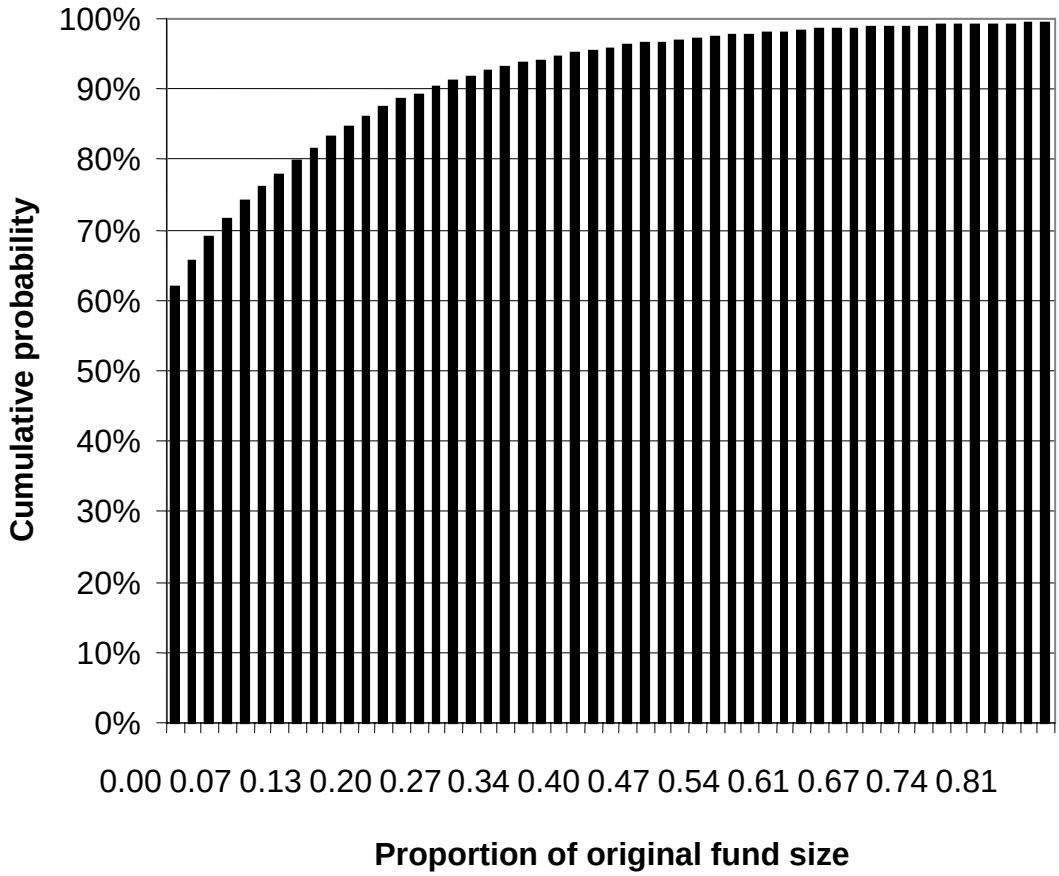


Fig. 8.3 shows the cumulative distribution of the value of the remaining fund at age 75 as a proportion of his original fund at age 65. If the value of the remaining fund is positive at 75, the individual will be better off than he would have been had he simply purchased an annuity at age 65. The figure shows that there is a 65% chance that the funds will be depleted before the age of 75, but this means that there will be a 35% chance of doing better than the annuity.

An investment return on the managed fund of approximately 9.25% pa in excess of RPI and expenses would be required to give a 75% probability of an individual adopting this approach having a positive fund at age 75.

8.1.3 Unit-linked annuity

In this case the individual uses his retirement fund to purchase a unit-linked annuity at age 65. His income will change in line with changes in the price of the underlying units. It must be recognised that the initial income payable to the individual will be less than that available from a non-linked annuity but this sacrifice will be offset by faster income growth with the index-linked annuity if subsequent investment performance is strong.

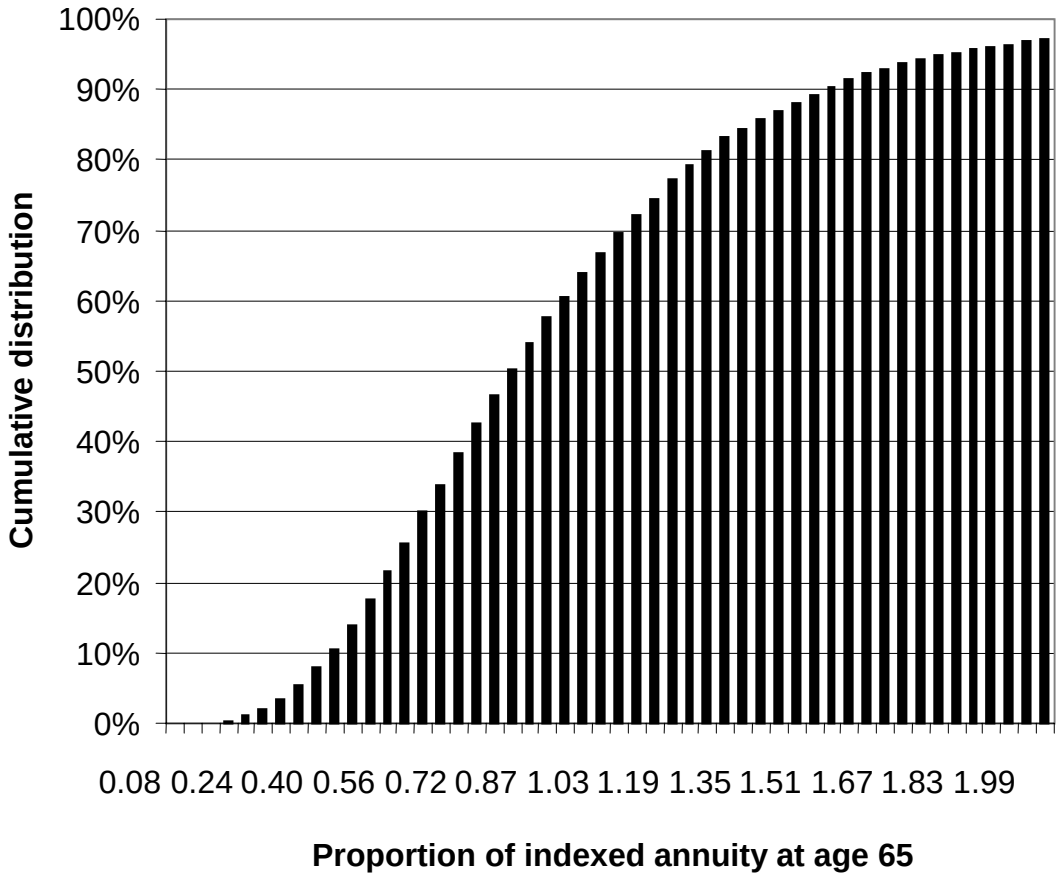
Fig. 8.4 shows the cumulative distribution of the size of the payments from the unit-linked annuity payable at age 75 as a proportion of the annuity payments he would have received at age 75 had he bought an annuity on retirement at age 65. The figure shows that the individual has a 65% chance of doing less well by taking out a unit-linked annuity, although this implies that he has a 35% chance of doing better if investment performance turns out to be strong.

An investment return on the managed fund of approximately 8.75% pa in excess of RPI and expenses would be required to give a 75% probability of an individual adopting this approach having a larger income at age 75 than he would have obtained had he bought an annuity at age 65.

8.1.4. Flexible unit-linked annuity

In this case the individual uses his retirement fund to purchase a flexible unit-linked annuity at age 65. He purchases a number of units in a managed fund. Each year he receives a payment from the fund equal to that which he would have obtained had he used whatever fund remains to purchase an annuity at that time, with the annuity amount being calculated at an interest rate in line with the returns expected to be obtained on the managed fund. This type of annuity therefore differs from a standard unit-linked annuity, since the payments to the individual are recalculated each year and will depend both on

Fig. 8.4 Cumulative distribution of unit-linked annuity (Unisex aged 75 in 2050)



the size of his fund and the prospects for mortality at the time. The annual payment includes a 'survival bonus' to the individual to reflect the fact that he has survived for that year, whereas some other policy holders will have died during the year. This bonus acts to offset the mortality drag that would otherwise be experienced.

Fig. 8.5 shows the cumulative distribution of the size of the payments from the flexible unit-linked annuity payable at age 75 as a proportion of the annuity payments he would have been receiving at age 75 had he bought an annuity on retirement at age 65. The figure shows that the individual has a 55% chance of doing less well by taking out a flexible unit-linked annuity, although there is a 45% chance of doing better if investment performance is strong.

An investment return on the managed fund of approximately 7.50% pa in excess of RPI and expenses would be required to give a 75% probability of an individual adopting this approach having a larger income at age 75 than he would have obtained had he bought an annuity at age 65.

8.1.5. With-profit annuity

In this case the individual uses his retirement fund to purchase a with-profit annuity at age 65. The initial payment on the with-profit annuity is calculated using an anticipated bonus rate. The subsequent annuity payments will rise or fall depending on the actual bonus rates declared by the insurance company.

It is recognised that the declared bonus rates of any particular insurance company will depend on its own policy towards distributing surplus and also its financial strength. This means that a general stochastic model of with-profit business is unlikely to be an exact guide to the bonus experience of any particular insurance company. In constructing the stochastic model of a with-profit annuity it has been assumed that the insurer will wish to make payments on the policy based on smoothed investment returns. In the model used here all the bonus rates quoted refer to bonuses in excess of inflation. It has been assumed that the anticipated bonus rate is 3.5% in real terms, the same as the expected return on assets net of expenses. The insurance company has been assumed to declare an annual bonus rate depending on the realised return on funds invested substantially in equities. The declared bonus rate will be equal to the real return on these funds unless this is negative in which case a zero bonus rate will be declared or the real return exceeds 7% in which case a bonus rate of 7% will be declared[31].

Fig. 8.6 shows the cumulative distribution of the size of the payments from the with-profit annuity payable at age 75 as a proportion of the annuity payments he would have been receiving at age 75 had he bought an annuity on retirement at age 65. The figure shows that, as expected, the range of outcomes which might occur is smaller and less skewed

Fig. 8.5 Cumulative distribution of flexible unit-linked annuity (Unisex aged 75 in 2050)

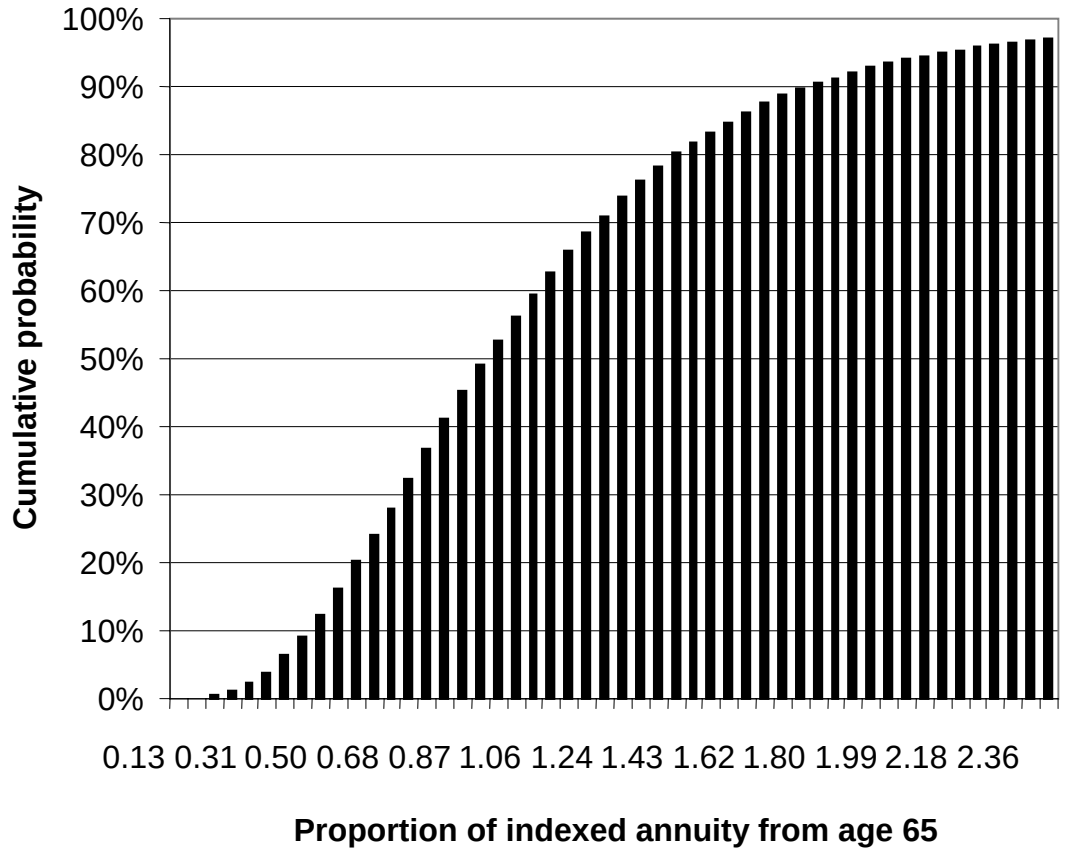
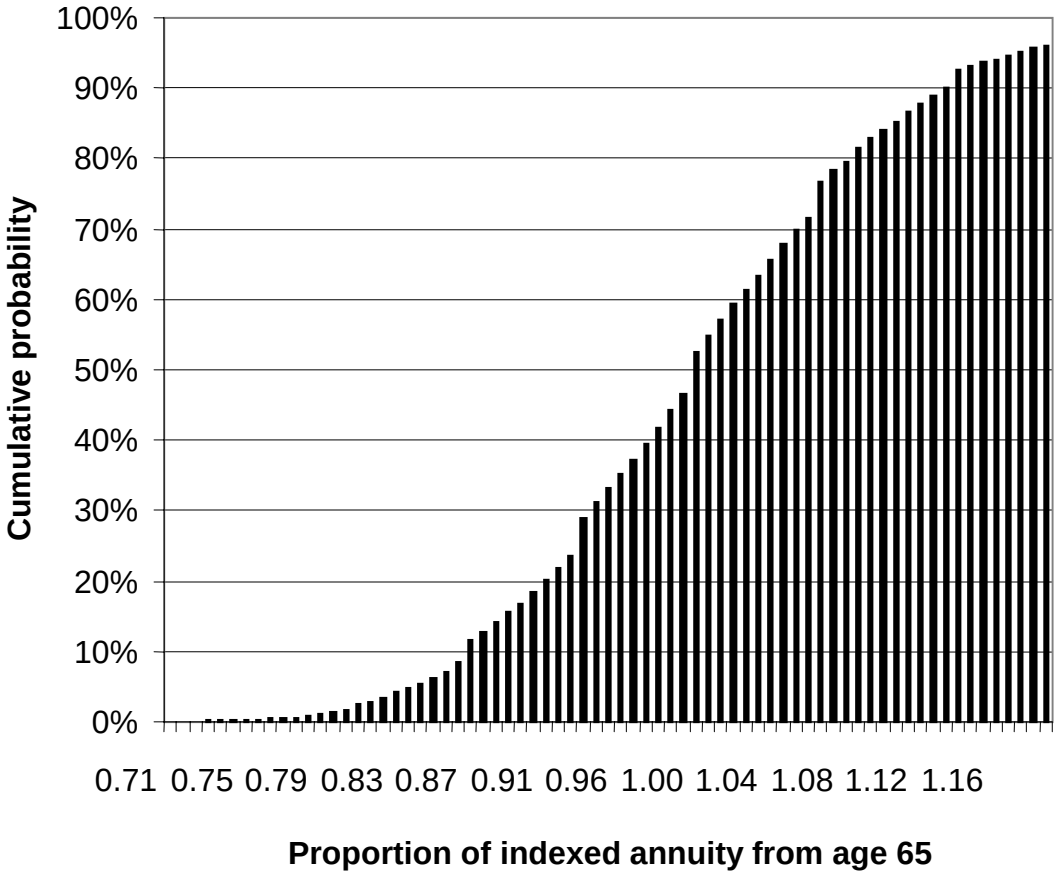


Fig. 8.6 Cumulative distribution of with-profit annuity (Unisex aged 75 in 2050)



than would result from a unit-linked annuity. There is a 54% probability of doing less well than with the annuity purchased at 65, but a corresponding 46% chance of doing better.

An investment return on the underlying assets of approximately 4.25% pa in excess of RPI and expenses would be required to give a 75% probability of an individual adopting this approach having a larger income at age 75 than he would have obtained had he bought an annuity at age 65.

None of these alternatives to annuities generates an assured income by the age of 75 that is higher than that from the annuity purchased at 65. The probabilities of failing to do are summarised in Table 8.1: they range from 73% for income drawdown to 54% for the with-profit annuity. Corresponding to this, real returns (after charges) of between 9.50% and 4.25% on the investments need to be generated before these alternatives to the annuity dominate the annuity with a probability of 75%.

The with-profit annuity dominates the other vehicles. The explanation for this lies in the smoothed nature of the investment returns associated with with-profit annuities. When investment performance is disastrous and the value of the fund falls by a significant amount and assets still have to be sold to pay the pension, the remaining fund can become so depleted that even with good subsequent performance it might not recover sufficiently to maintain the pension in future years. This means that high returns can never fully compensate for poor returns if the fund also has to pay an income stream regardless of investment performance. Therefore what is needed to achieve (with a high degree of probability) a higher pension with an equity-based investment than that from a standard annuity (which is based on the return on bonds) is to have the extremes of returns on the equity-based investment curtailed. This is precisely what happens with a with-profit annuity. This is confirmed by the second column of Table 8.1 which shows the probability of failing to do as well as 90% of the annuity purchased at 65: it is just 17% for the with-profit annuity and much higher for the other products.

The effect is the precise inverse of cost averaging during the accumulation stage of an investment programme with regular contributions. During accumulation, the average size of the terminal fund will be higher if the fund is invested in assets with a high dispersion of returns than if the fund is invested in assets with a low dispersion of returns but with the same expected return. This is because there is a greater probability of buying assets at low prices. During decumulation when a regular income has to be paid from the fund, it is better to do this from assets with a low dispersion of returns than with assets with a high dispersion even if the expected returns are the same. This is because there is a bigger chance of having to sell assets at low prices.

The Working Party felt that once the MRI had been secured, there should be a great deal more flexibility over the use of the Residual Fund. But the Working Party also felt that this flexibility should be based on informed choices taking into account the higher costs

and risks of the alternatives as well as their higher expected returns from their greater equity investment. This section demonstrates very clearly the importance of securing the MRI before it is sensible to consider alternatives to annuities. It also clearly demonstrates the very high risks associated with income drawdown and the potential benefits of with-profit annuities. Guaranteed with-profit annuities, which offer a minimum annual income, could be an even better retirement product.

Table 8.1 Summary of the performance of the alternative vehicles to a standard annuity for a male aged 75

	Probability of failing to do as well as the annuity purchased at 65 (%)	Probability of failing to do as well as 90% of the annuity purchased at 65 (%)	Real investment return (after charges) needed to give a 75% probability of doing better than the annuity purchased at 65 (%)
Income drawdown	73	68	9.50
Income drawdown with deferred annuity	65	NA*	9.25
Unit-linked annuity	63	53	8.75
Flexible unit-linked annuity	55	48	7.50
With-profit annuity	54	17	4.25

* Guaranteed to match 100% of the annuity purchased at 65 by means of a deferred annuity payable from age 75.

9 Proposal: Measures Should be Taken to Improve the Design of Annuities

The Report **proposes** that measures should be taken to improve the design of annuities for those who choose to use their Residual Fund to purchase annuities at some stage.

With the Minimum Retirement Income having been secured through the purchase of an RPI annuity (or equivalent) at Retirement Age, this will allow the life assurance industry to become much more innovative in the management of the Residual Fund. This new freedom would, in turn, require a relaxation in legislative restrictions, including those on

international competition in the domestic annuity market. It would also require a recognition of the current deficiency of the financial markets in providing long-term cost-effective risk management tools, as evidenced, for example, by the high costs of running a derivatives portfolio or by derivatives of insufficient duration to hedge long-term risks.

As outlined in Section 4, the main risks that require hedging effectively and economically are interest rate risk, inflation risk and longevity risk. Another important feature of the design is charging structures. Greater flexibility in regulations is also needed.

9.1 Interest rate risk

Until very recently, the insurance industry (especially in Europe) has been reluctant to offer products that help annuitants hedge the risks, especially interest rate risk, that they have been forced to assume themselves. Yet a whole range of financial instruments and strategies is available (at least in theory) to help them immunise interest rate risk[32].

9.1.1 Phased annuities

The simplest strategy is a planned programme of phased deferred annuity purchases in the period leading up to retirement (say one per year in the five-year period leading up to retirement), using the principle of cost averaging. An alternative strategy would be keep the fund fully invested up to retirement, but have a planned programme of annuity purchases over a specified period after retirement.

9.1.2 Adjustable annuities

Another simple strategy would be adjustable annuities which rebases rates periodically (say every three years).

9.1.3 Protected annuity funds

A more sophisticated form of pre-retirement planning is protected annuity funds which employ derivative instruments.

One example places a fraction (e.g., 95%) of the funds on deposit and the rest in call options on bond futures contracts: if interest rates fall during the life of the option, the profit on the options will compensate for the reduced interest rate.

Another example places a fraction of the funds in bonds and the rest in call options on an equity index, thereby gaining from any rise in the stock market over the life of the options.

9.1.4 Investment-linked annuities

Investment-linked annuities provide a potential solution for individuals with a high

degree of risk tolerance. As we showed in Section 8.3 above, there is some chance that individuals can end up with a larger pension from investment-linked annuities than from level or indexed annuities. However, as we also showed, the charges with investment-linked annuities also tend to be much higher than with standard annuities.

9.1.5 Individual retirement accounts with longevity insurance

This suggestion would enable individuals to keep their pension fund fully invested in insured fundsor in collective investment schemes without having to purchase an annuity at any particular age. They would separately insure against running out of resources before they die. The greater transparency with this structure might lead to lower charges than with a formal annuity.

9.2 Inflation risk

The government could also do more to ameliorate some of the market failures in the private provision of annuities which arise, in part, from aggregate risks that are beyond the abilities and resources of private insurance companies to hedge. A number of proposals have been suggested recently to help the private sector hedge inflation risk.

9.2.1 Deferred income government securities

For example, in order to help the private sector hedge against inflation risk more effectively, the Goode Report (1993, Sec. 4.4.44) in the UK suggested that the government introduce a new type of bond, with income and capital linked to the retail price index, but with payment of income deferred for a period. Such bonds were given the name Deferred Income Government Securities (DIGS). DIGS could be introduced with different starting and termination dates and would allow all deferred pensions to be indexed to prices. DIGS have not so far been introduced in the UK, although the introduction of the government bond (gilt) strips market in 1997 could help UK insurance companies construct DIGS synthetically.

9.2.2 Limited price index bonds

The introduction of 'limited price index bonds' would simplify the provision of annuities that were subject to Limited Price Indexation.

9.3 Adverse selection and longevity risk

The main causes of private market failure in annuity provision are the risks associated with adverse selection and longevity.

9.3.1 Mandatory membership of second-pillar pension plans

Mandatory membership of second-pillar pension plans would do much to remove the adverse selection bias in the demand for annuities by bringing the select group that purchases annuities closer to that of the population as a whole.

9.4 Underestimating increases in longevity

If the adverse selection bias is removed, increases in longevity amongst annuitants would correspond more closely to those of the population as a whole. In other words, while there would be aggregate risks associated with longevity increases, there would be fewer specific risks.

9.4.1 Survivor bonds

The State could help private sector annuity providers hedge the aggregate longevity risks that they face by issuing Survivor Bonds, a suggestion made in Blake, Burrows and Orszag (1999).

These are bonds whose future coupon payments depend on the percentage of the population of retirement age on the issue date of each bond who are still alive on the date of each future coupon payment. For a bond issued in 2000, for instance, the coupon in 2010 will be directly proportional to the amount, on average, that an insurance company has to pay out as an annuity at that time.

The insurance company which buys such a security bears no aggregate longevity risk and, as a consequence, cost loadings fall.

The insurance company would still retain the specific risk associated with the pool of annuitants that purchase its annuities (e.g., it might explicitly market annuities to groups such as non-smokers who can be expected to experience lighter than average mortality), but this is likely to be a smaller and more forecastable risk than the risk associated with underestimating aggregate longevity increases many years ahead.

Initial soundings from UK Treasury officials and insurance companies, however, indicate some hostility to the concept of survivor bonds. The UK Treasury has an obligation to raise funds at the lowest cost to the tax payer and an insurance company representative on the Working Party argued that the government has absolutely no reason to issue them ‘unless they want to take over the role of the insurance industry’. The idea has found more favour outside the UK, however, especially in the US and also in some former Soviet-block countries where mortality data is non-existent and they are seen as one way of kick-starting a private sector insurance industry.

9.5 Simplifying charging structures

Charging structures for products such as income drawdown lack transparency: they can be complex and confusing. Very few consumers understand their full significance, especially the high front loads that are extracted and the disguised way in which annual charges are imposed. The Report notes that the introduction of CAT-marking for stakeholder pensions may eventually extend to other retail financial products.

9.6 More flexible annuity regulations

The Report **recommends** that annuity regulations need to be made more flexible to allow individuals to choose the kind of options outlined in Section 4.1.8 above.

10 Wider Implications of These Proposals

Our proposals have a number of wider implications.

First, they could alter the behaviour of members of other types of pension plans. For example, they might provide an incentive for members of final salary schemes to convert to DC plans just prior to retirement. This incentive increases the greater the difference between the final salary pension and the MRI.

Second, they might change the nature of the annuity market. On the one hand, if only relatively small sums need to be annuitised, scale economies are not fully exploited and this raises unit costs. On the other hand, if everyone has to annuitise at retirement age, this will help to bring annuitant mortality rates closer to those of the population as a whole and this will help to improve annuity rates. It is not clear what the net effect will be.

Third, with a steady increase in the size of the DC pensions market over time, there will be a commensurate increase in the demand for annuities and hence in the demand for suitable matching assets. A key question is: will there be an adequate supply in the future of appropriate financial instruments to match the rising demand for annuities? Some commentators have argued that the future supply from traditional sources will not be adequate. For example, Bishop (1999)[33] demonstrates that in 1999 the market for long sterling bonds was severely distorted by two factors: a near balance in the UK government's finances which has reduced the supply of new long gilts and a high demand for gilts from life and pension funds to back both annuity sales and the Minimum Funding Requirement[34] of the 1995 Pensions Act. As a result, 10-year yields in the UK were 3 percentage points below those of Euroland. The restrictions on the PSBR and National Debt imposed by the Maastricht Treaty[35] make it unlikely that life and pension funds can rely on the UK government providing a sustainable long-term source of gilts in

the future. New sources must therefore be sought both domestically and internationally. On the domestic scene, growth in the non-gilt sterling bond market needs to be encouraged. For example, the utilities (such as the gas, electricity and water companies) are natural issuers of indexed bonds, since their regulators allow their charges to be indexed to inflation; to date, though, the corporate index-linked bond market is just £1bn in size with £503m of this accounted for by a British Gas issue in December 1999. The current very low real long term interest rates might encourage more such issues. Similarly, in a period of low sustainable inflation, the size of the UK corporate bond market might begin to rise towards that of the US (relative to GDP) and this would provide another important source of supply. On the international scene, a greater use of currency swaps needs to be encouraged.

In any event, the present and likely future shortage of gilts helps to justify our proposal that the pension fund should be annuitised only up to the level needed to meet the MRI.

11 Conclusion

In principle, a defined contribution pension plan is a very straightforward financial product: there is an accumulation stage during the working lifetime, followed by retirement and then a decumulation stage. However, current arrangements have resulted in a complex set of choices at the point of retirement. Should an individual buy a level annuity or an indexed annuity? Should they delay this choice and instead use drawdown? Most individuals are confronted with these choices without having a clear idea of the benefits or the risks or the costs involved. This underlines the importance of the conduct of business rules and the risk warnings given to customers. The proposals in this Report seek to clarify the arrangements at the retirement age with the security of the pension being a primary objective, but at the same time allow much greater flexibility if circumstances permit.

The simple answer to the question of whether there is a realistic alternative to life annuities in defined contribution pension plans is: no, not really. The real questions are: what is the minimum acceptable level of annuitisation?, how should the State recover the tax breaks during the retirement phase of the plan?, and how can current shortcomings of annuities and annuity regulations be removed or ameliorated?

This Report has attempted to answer these questions in the following manner. It proposes that individuals should be required to purchase RPI life annuities (or their equivalent) only up to the same level of income as the State's current second pension SERPS[36]: after all, the objective of the contracting out requirements is to end up with a pension broadly comparable with SERPS benefits foregone.

Above this level, there can be much greater flexibility in the manner in which the remaining funds are drawn down. The Report lists a number of ways in which flexibility can be improved, but does not recommend any particular way.

However, the greater desired flexibility in retirement provision that we seek can only be fully achieved if the State and the financial services industry become more innovative.

The State should establish an institutional framework for the pension annuity business that offers the appropriate incentives for annuity providers to compete effectively and economically. One aspect of this would be to make second pensions mandatory, since this would help to reduce the costs associated with both adverse selection and the marketing of voluntary arrangements. Another would be to establish a life-long education campaign beginning in schools. Another would be to relax the restrictive regulations surrounding annuities.

The financial services industry should also show greater innovation in using existing financial instruments and established investment management strategies to help its customers hedge risks such as interest rate risk.

Finally, we believe that it is important to point out that, although we have suggested improvements in the security and flexibility of pension plans during the retirement stage, no improvements at this stage can adequately compensate for insufficient contributions made into a pension plan during the accumulation stage. Suggestions for improving security and flexibility during retirement will make little difference if the fund accumulated on the retirement date is a small one.

Glossary

Adverse Selection
This is the risk that individuals who believe that they are likely to live longer than the average for the population of the same age will be more likely to voluntarily choose to purchase annuities.

Annuity
A life annuity is a financial contract that provides regular income to the annuity purchaser for his or her remaining life. The different types of annuities commonly sold are explained in Appendix A to this Report.

Basic State Pension (BSP)
The flat rate State pension paid to all who have met the minimum National Insurance contribution requirements. A widow, widower or in some cases a married woman may also claim a Basic State Pension on the contribution record of his or her spouse.

Capital Protected Annuity
An annuity which, on death, returns the excess of the purchase price over the payments the annuitant has already received.

CAT standards
The standards for charges-access-terms that have been applied to Independent Savings Accounts (ISAs) and stakeholder pension plans.

Deferred Annuity
An annuity which commences from a future date.

Defined Benefit (DB) Pension Scheme
A pension scheme in which the rules specify the benefits to be paid, and the scheme is financed accordingly.

Defined Contribution (DC) Pension Scheme
A pension scheme in which the determination of an individual member's benefits is by reference to contributions paid into the scheme in respect of that member, usually increased by an amount based on the investment return on those contributions.

Deterministic Model
A model in which the factors driving the model (e.g. asset returns in an investment programme) are assumed not to vary over time.

Deferred Income Government Securities (DIGS)
A type of bond, with income and capital linked to the retail price index, but with payment of income deferred for a period.

Flexible Unit Linked Annuity
A type of unit linked annuity where the payments to the annuitant are recalculated each year and depend on the size of the fund and the prospects for mortality at the time. In addition, the annual payment includes a 'survival bonus' to the annuitant to reflect the fact that he/she has survived for that year, whereas some other policy holders will have died during the year.

Income Drawdown
An arrangement whereby individuals are permitted to draw an income from a pension fund for a specified period, before purchasing a standard annuity.

Index Linked Annuity
An escalating annuity where the payments are increased in line with increases in the retail price index.

Life Annuity
An annuity where payments continue until the death of the annuitant.

Limited Price Indexation (LPI)
A rate of pension increase which is in line with RPI, but with a maximum of 5% p.a.

Joint-Survivor Annuity
An annuity where payments continue until the death of the second life.

Lower Earnings Limit (LEL)
The income level below which National Insurance contributions are not payable. It is broadly equal to the single person's Basic State Pension. SERPS benefits are based on earnings above the LEL, and up to the Upper Earnings Limit.

Minimum Income Guarantee (MIG)
A minimum income guarantee to pensioners through Income Support.

Minimum Funding Requirement
A requirement introduced in the 1995 Pensions Act for defined benefit pension schemes to aim for a minimum level of funding using a prescribed method and basis of calculation.

Minimum Retirement Income (MRI)
The level of retirement income which this Report recommends should be met by means of an RPI life annuity.

Monte Carlo Simulation
Repeated simulation of a stochastic model. The purpose is to generate a distribution of outcomes for a variable of interest (e.g., the terminal fund size from an investment programme).

Mortality Cross Subsidy
This is a cross-subsidy allowed for in annuity rates which arises because some annuitants will die shortly after taking out an annuity thereby releasing a 'mortality profit' which insurance companies share with longer-surviving annuitants.

Mortality Drag
This is the term for the extra returns which must be earned on a drawdown product to offset the lack of any mortality profit.

Mortality Profit
See Mortality Cross Subsidy.

Normal Distribution
A well known bell-shaped statistical distribution which can act as an approximation to the distribution of investment returns available from some financial instruments.

Occupational Pension Scheme
An arrangement organised by an employer to provide pensions and/or other benefits for or in respect of one or more employees on leaving service or on death-in-service or in retirement.

Pay-as-you-go Pension Plan (PAYG)
An arrangement under which benefits are paid out of the current contributions of active members and no funding is made for future liabilities.

Personal Pension Scheme
A pension arrangement available to individuals who are self-employed, or employed but not members of an occupational pension scheme.

Residual Income Requirement (RIR)
This is the amount that needs to be annuitised from a DC pension fund according to the recommendations of this Report. It is the difference between the MRI and the sum of certain other sources of income which have been adjusted to be equivalent to index linked incomes. The relevant sources of income are those that are payable for the remaining life of the individual.

Residual Fund
The original fund at retirement less the tax-free lump sum and less the purchase price of the MRI annuity.

State Earnings Related Pension Scheme (SERPS) Pension
The additional or supplementary earnings-related pension available from the State. Will be replaced by the State Second Pension in 2002.

State Pension Age
The age from which pensions are normally payable by the State scheme, currently age 65 for men and age 60 for women. State pension age is to be equalised at age 65. The increase in woman's pension age will be phased in between 2010 and 2020.

Step Down Annuity
This is an annuity that reduces to specified levels at particular dates in the future.

Stochastic Model
A model in which the factors driving the model (e.g. asset returns in an investment programme) are assumed vary randomly over time.

Survivor Bonds
These are bonds whose future coupon payments depend on the percentage of the population of retirement age on the issue date of each bond who are still alive on the date of each future coupon payment.

Unisex Annuity Rates
Annuity rates which do not distinguish between gender.

Unit Linked Annuity
This is an annuity in which the capital sum is invested in unit-linked funds (unit trusts or other mutual funds) and each year a fixed number of units are sold to provide the annuity.

Upper Earnings Limit (UEL)
The maximum amount of earnings (equal to approximately seven times the lower earnings limit) on which National Insurance contributions are payable by employees.

With-Profit Annuity
This is an annuity in which the capital sum is invested in the with-profit fund of an insurance company and the annuity is based on an assumed or anticipated annual bonus (or crediting) rate.

Appendix A – Types of Annuities[37].

A.1 Purchase arrangements

Single-premium annuity: the cost of the annuity is paid in a single lump sum.

Regular-premium (or *instalment*) *annuity*: the cost of the annuity (which by definition will be a deferred annuity) is paid by regular instalments (either in the form of *fixed premiums* or *flexible premiums*). It is rather like an integrated defined contribution pension scheme. During the accumulation stage, there is both an accumulation value and a surrender value. The accumulation value equals the premiums paid plus investment returns less expenses. The surrender value is equal to the accumulation value less a surrender charge which typically reduces to zero at the end of the surrender charge period. Should the policy holder die during the accumulation stage, the surrender value of the policy goes to the policy holder's estate; similarly, the policy holder can make a withdrawal up to the surrender value during the accumulation period. A variation on this is the:

Two-tier annuity: the accumulation value will be received only if the policy is subsequently annuitised for a minimum period (eg 5 years), and the surrender value is always less than the accumulation value to discourage early withdrawal.

A. 2 Coverage

Single-life annuity: payments cease on the death of the annuitant (without refund of the balance of capital).

Joint-life annuity: payments cease when the first of the lives covered dies; the second life receives no further payments after this date.

Joint-and-last-survivor annuity (or simply a *joint-survivor annuity*): payments continue until the death of the second life (usually the surviving spouse). Typically, after the death of the first annuitant, the annuity continues at a lower rate, eg, one-half or two-thirds. The size of the annuity depends on the age difference between the two lives.

Survivor (or *reversionary*) *annuity*: payments begin on the death of the nominator (the covered life) and continue until the death of the beneficiary of the policy (called the annuitant), unless the beneficiary dies first, in which case the policy expires worthless.

Group annuity: covers a group of individuals, such as the employees of a company, not necessarily by name, rather by characteristics (such as age and sex).

A. 3 Variations

Temporary annuity: payments are made for a fixed period or until the annuitant dies, whichever is sooner.

Certain annuity: payments are made for a fixed period, whether or not the annuitant dies.

Whole annuity: payments continue until the annuitant dies.

Annuity *with minimum guarantee* (*period-certain annuity*): payments are made for a minimum period (eg, 5 or 10 years), however long the annuitant lives.

Annuity *with minimum guarantee and overlap*: the spouse's income and income during the guarantee period are paid simultaneously.

Annuity *with proportion*: on the death of the annuitant, the proportion owing since the last payment is paid (important feature if annuity is paid annually).

Annuity *with capital protection:* the balance of the capital is paid to the annuitant's estate when s/he dies. Variations on this include:

Cash-refund annuity: the balance of the capital is paid as a lump sum.

Instalment-refund annuity: the balance of the capital is paid in instalments.

A.4 Other Features

Health: Impaired life annuities: where the prospective annuitant is expected to experience heavier mortality than the average annuitant (say as a result of a fatal illness or, indeed, as a result of lifestyle, such as being a smoker), higher than standard annuity rates apply.

Long term care: Long term care annuities have a long term care insurance policy attached to them to provide for potential future nursing fees.

Gender: Uni-sex annuities: the annuity rate is the same for males and females. With conventional annuities, for a given purchase price, the annuity payable to a male exceeds that to a female on account of the generally heavier mortality experienced by males. Uni-sex annuities therefore involve a cross-subsidy from men to women.

Tax: Compulsory purchase annuities (CPAs): the full amount of the annuity is subject to income tax. In countries, such as the UK, which operate an EET tax system for their

pension arrangements (ie, contributions into the pension scheme are *Exempted* from tax, investment returns are *Exempted* from tax, but the pension in payment is *Taxed*), it is usually mandatory in DC schemes to use the lump sum on the retirement date to purchase a life annuity; because of the tax subsidy involved in generating this lump sum, the full amount of the annuity is taxed as income. In contrast, the voluntary purchase of a life annuity is typically made from post-tax resources. Such annuities are known as *purchased life* annuities (PLAs). Recognising that an annuity payment involves both an income element and a return of capital element, the tax authorities only tax the income element in the case of PLAs.

A.5 Payment Terms

Timing of payments:

Immediate annuity (*annuity in arrears*): payments commence at the end of the first period.

Annuity-due (*annuity in advance*): payments commence at the beginning of the first period.

Deferred annuity: first payment is delayed for a number of periods.

Phased annuities (*phased* or *staggered vesting*): a series of annuities are purchased at regular intervals.

Payment frequency: monthly, quarterly, semi-annual, annual.

Currency of denomination: domestic currency or key foreign currencies.

Payment types:

Level annuity: pays a fixed amount in nominal terms for the duration of the annuity. All other types of annuity pay variable amounts.

Step Down Annuity: an annuity that reduces to specified levels at particular dates in the future.

Adjustable Annuity: an annuity which rebases rates periodically (say every three years).

Escalating annuity: an example is a *constant-growth annuity*, where the annuity increases annually at a fixed rate of, say, 5%. The starting payment is much lower than with a level annuity costing the same amount.

Index-linked annuity: an example of an escalating annuity where the payments are increased in line with increases in the retail price index.

Limited price indexed (LPI) annuity: this compensates for inflation up to a stated limit (eg, 5% per annum compound).

Investment-linked annuities: The best known example of these in the US are known as 'variable annuities'. They were first issued in 1952 in the US by the TIAA-CREF[38].

A lump sum is used to buy units in a diversified fund of assets (mainly equities) and the units are sold on a regular basis to provide the annuity. The size of the annuity depends on the income and growth rate of assets in the fund. The annuity can fall if the value of the assets falls substantially, so there is some volatility to the annuity in contrast with a level annuity. But since the pension from a level annuity is based on the return on government bonds, it is possible that the pension from a investment-linked annuity, based on the return on equities, will generate a higher overall income (assuming that the duration of the annuity is sufficiently great and that the charges on investment-linked are not excessive).

Examples of investment-linked annuities in the UK are with-profit and unit-linked annuities, but only a few insurance companies offer them. They allow a wider range of investments, including equities, and produce an income related to the performance of the underlying assets. This can either be via a with-profit fund or a conventional unit-linked fund.

With-profit annuity: the capital sum is invested in an insurance company's with-profit fund and the annuity is based on an assumed or anticipated annual bonus (or crediting) rate (eg 8%). The initial payment is lower than with an equivalent level annuity, but is higher the higher the assumed bonus, although, as a consequence, the subsequent rate of increase in the annuity is lower. However, the annuity could fall in value if the assumed bonus rate turns out to exceed the actual declared bonus rate. Some providers offer a two-tier bonus system: an annual reversionary bonus, which, once declared, cannot be removed, and an annual terminal bonus, which applies only for the year in question and can be raised or reduced in subsequent years. Although the annuity can fluctuate, with-profit annuities normally provide a guaranteed minimum annuity. They are considered less risky than unit linked due to the 'smoothing' effect of a with-profit fund. Funds are subject to other charges such as an annual management fee, a policy fee and in some cases a set-up fee. A recent innovation is the *guaranteed with-profit annuity* which provides a minimum annual income whatever the underlying investment performance.

Example of with-profit annuity[39]

Male aged 65 uses £100,000 to purchase a single-life with-profit immediate annuity with an anticipated bonus of 8%: the starting level for the annuity is £11,449.

Year	*Reversionary bonus declared (%)*	*Annuity payments (£)*
1	0	11,449
2	0	10,601
3	0	9,816
4	0	9,089
5	10	9,257
6	10	9,428
7	10	9,603
8	10	9,781
9	10	9,962
10	9	10,054
11	8	10,054
12	8	10,054
13	6	9,868
14	5	9,594
15	7.5	9,594
16	9.5	9,682
17	11	9,951
18	12.5	10,366
19	14	10,941
20	15	11,651

No bonus is declared in the first four years, so the annuity payments must fall. In years 5-10, the actual bonus exceeds the anticipated bonus, and this allows the annuity payments to rise. In years 11-12, the anticipated and declared bonuses are the same and so the annuity payments remain unchanged. From year 13 on, the bonuses vary year by year and the annuity rises or falls accordingly.

Unit-linked annuity: the capital sum is invested in unit-linked funds (unit trusts or mutual funds) and each year a fixed number of units are sold to provide the annuity. The initial payment is lower than with an equivalent level annuity. The annuity either fluctuates in line with unit trust (or mutual fund) prices, or is assumed to grow at a constant rate, eg, 10% pa; in the latter case, if investment performance is lower than this, the income from the annuity falls and *vice versa*, in a similar manner to the with-profit annuity. If a unit-linked annuity is selected, the purchase price is exchanged for a number of units in an investment fund at retirement. Some unit-linked funds (e.g, the Ariadne fund) guarantee a

minimum performance in line with a particular index. Such a guarantee would improve the attractiveness of unit-linked annuities.

Income drawdown or *managed annuity* (also known as *managed pension* or *income withdrawal* or *deferred annuity purchase*): the capital sum remains invested in a fund and individuals are permitted to draw an income from the fund for a specified period, before purchasing a standard annuity. They were first introduced in the UK as a result of the 1995 Finance Act, following an unprecedented fall in government bond yields and hence annuity rates during the early 1990s: individuals retiring during this period were locking themselves into very low level-annuities. In the case of the UK, individuals can delay drawing an annuity until age 75, during which time they can draw an income from the fund that is between 35% and 100% of that available from a single-life level annuity. Tables for doing this are supplied by the Government Actuary, and the arrangements have to be reviewed triennially. If the individual dies before the annuity is purchased: the individual's spouse can continue using the drawdown facility until age 75 and if s/he, in turn, dies before this age, the balance of the fund forms part of his/her estate; or the spouse can purchase a standard annuity; or the balance of the fund can be received as a lump sum, subject to a 35% capital charge. There are various costs or risks associated with drawdown. First, annuity rates might actually be lower by the time the individual reaches 75. Second, investment performance during the deferral period might be poor with the result that the fund falls in value. Third, by not buying an annuity, individuals forego a 'mortality cross-subsidy' (a cross-subsidy allowed for in annuity rates which arises because some annuitants will die shortly after taking out an annuity thereby releasing a 'mortality profit' which insurance companies share with longer-surviving annuitants): the mortality cross-subsidy is cumulative over time, and by delaying the purchase of an annuity, individuals experience a so-called 'mortality drag' (see Appendix C below). Finally, the charges with income drawdown are higher than for annuities. For example, the following charges are extracted on its drawdown policies by National Mutual Life, which has been voted one of the top policies by Sherwood Planned Savings over last two years:

Set-up charge	£50
Bid-offer spread	5%
Minimum allocation rates	98% on funds between £10,000 and £49,999; 98.5% on funds exceeding £50,000
Drawdown charge	£5.00 per month for stand-alone non-Protected Rights or Protected Rights[40] drawdown policy(ies). Additional £2.50 per month if Protected Rights is part of a larger transfer value received

Investment management charge	between 0.39% and 0.96% of the fund value per annum depending on the unit trust chosen by the individual
Additional charge made by cancellation of units	up to 1% per annum
Charge for changing the level of income drawn	£50 (the first change in any one year is free).

Market-value-adjusted (MVA) annuity: a hybrid arrangement for a deferred annuity lying between a fixed and variable annuity. The annuity rate is fixed for a specified period, but the surrender value of the policy adjusts in line with the market value of the underlying investments if it is surrendered before the end of this period. At regular intervals (eg every 5 years), a window opens enabling a withdrawal to be made without a MVA.

Appendix B – Summary of Annuity Arrangements in Some Key Overseas Markets.

B.1 The US[41]

B.1.1 Background

The US pensions system is complex with the State, employers and individuals all playing important roles.

B.1.1.1 The State system

State retirement benefits are available from the Social Security system. Social security benefits are available to people who have worked for at least ten years. They are based on earnings averaged over most of an individual's working life (somewhat like SERPS in the UK). The formula for calculating benefits is somewhat complex, but a worker with average earnings can expect a retirement benefit that represents about 42 percent of his or her average lifetime earnings. Low income workers can expect a higher percentage and high income workers a lower percentage (Social Security Administration Publications (1999)).

There is a mechanism for assuring a minimum monthly income for elderly and disabled persons who have few assets. This is known as Supplemental Security Income Benefits and it supplements income up to a basic rate set by the federal government. Some states supplement this amount. This benefit is very strictly means tested (Social Security Administration Publications (1999)).

B.1.1.2 Employer-sponsored retirement plans

There is tax relief on contributions and investment returns. Income tax is payable on retirement benefits.

In the past most plans were defined benefit arrangements. Defined benefit arrangements are often set up to provide an income for life, but this is not obligatory. The entire benefit can be paid as a lump sum. There is no obligation to buy an annuity.

Today most companies offer defined contribution arrangements. There are 2 common forms:

1. 401(k) plans = for employees in private companies

2. 403(b) plans = for employees in public and non-profit organisations.

The employee decides the contribution and how it is invested. The employer may match contributions at, say, 25c or 50c (or even $1) per employee $1 contributed. Employee contribution limit (1999) is $10k pre-tax for 401(k) plans and the lesser of 20% or $9,500 of salary for 403(b) plans.

The employee can make additional contributions of taxed dollars, typically up to a total of 12% of salary. The investment growth is still tax free. In the case of after-tax contributions, when the corresponding benefits are distributed the contributions are treated as a non-taxable return of capital, but all investment earnings are treated as income.

It is common for 401(k) plans to provide at least some participant-directed investment. The types of investments are not restricted, but various fiduciary responsibilities are imposed on the plan operators (the so-called 'prudent man' principle) under the Employee Retirement Income Security Act of 1974 (ERISA).

The employee can borrow money from a 401(k) for any reason, at a prescribed interest rate with an agreed repayment term. Failure to repay invokes a tax liability. It is common for plans to allow specified 'hardship' withdrawals.

Draw down must start between 59½ and 70½ (or on retirement if later). The employee may be given the choice between pension payments or a single lump sum. Plans typically offer a lump sum and may also provide for payments over a period of years, such as the life expectancy of the participant and his/her beneficiary. The lump sum can be used by

an individual to create an income in retirement: for example, he/she may buy an annuity from an insurer at market rates or buy long-dated Treasury bills.

Most 401(k) plans do not offer annuity options because of the increased administrative burdens associated with annuities. For example, plans that offer an annuity are subject to 'joint and survivor requirements' under which a spouse must continue to receive payments after the death of the pensioner (Senate Committee (1999), p.12). If an annuity is not offered there are no requirements specifying a particular death benefit. The member's nominated beneficiary is entitled to the remaining account balance upon the member's death.

B.1.1.3 Individual Retirement Accounts (IRAs)

There are a number of types of IRAs.

Traditional IRAs

These are available to people with employment income. The maximum annual contribution is $2,000 (this limit applies to the total contributions to both traditional and Roth - IRAs). In some circumstances the non-working spouse of a member may contribute to another IRA. There are complex rules for deciding whether contributions are tax deductible. Broadly speaking contributions are deductible if the individual has no participation in a company-sponsored retirement plan. Investment growth is tax deferred. Distributions from pre-tax contributions are taxed as income. Distributions from post-tax contributions are treated as a non-taxable return of capital apart from any investment growth which is taxed as income. Individuals can assign the benefits to their children upon their death but these will be taxed. Transfers known as 'rollovers' can be accepted from employer plans when changing employer.

Draw down must start between 59½ and 70½. There is no requirement to buy an annuity. At age 70½ the individual must take a required minimum distribution (RMD) annually or be subject to penalties. The RMD is determined by a formula applied to the individual's life expectancy or the joint life expectancy of the individual and his or her beneficiary.

Roth - IRAs

These are available to people with incomes below a certain level (less than $110,000 for a single person) in the particular year of contribution. The maximum annual contribution is $2,000 (this limit applies to the total contributions to traditional and Roth IRAs). In some circumstances, the non-working spouse of a member may contribute to his/her own IRA. Contributions are not tax deductible. Investment growth is tax free. Distributions are free of tax if the account has been open for more than 5 years and the investor's age is greater than 59½). So long as the account has been open for five years up to $10,000 can be

withdrawn tax free to purchase a first home. There is no age by which the individual must start drawing income. It is possible for an individual to assign the payments to his/her children upon death, tax free.

SEP - IRA (Simplified Employee Pension IRA)

These are for the employees of small businesses. Contributions are made by the employer, up to 15% of each employee's total compensation, with a maximum annual contribution of $24,000. With the exception of the higher contribution limits, they are subject to the same rules as a traditional IRA.

SIMPLE - IRA (Savings Incentive Match Plan for Employees IRA)

These are for the employees of small businesses (fewer than 100 employees). Both the employee and the employer may contribute to the plan. The maximum employee contribution is $6,000. If the employees contribute to the plan the maximum employer contribution is the lesser of 3% of the employee's compensation and an equal match of the employee's contributions. If the employees do not contribute to the plan the maximum employer contribution is 2% of each employee's compensation. With the exception of the different contribution limits, these plans are subject to the same rules as a traditional IRA.

Keogh plans

These are for the self employed. In a Profit-Sharing Keogh, contributions are limited to the lesser of $30,000 or 13.4% of the individual's income from self employment. The contribution percentage can be adjusted yearly. In a Money Purchase Keogh, an individual can contribute 20% of income up to a maximum of $30,000. In this case, however, the contribution percentage cannot be changed from year to year. With the exception of the different contribution limits, these plans are subject to the same rules as a traditional IRA.

With all the different types of IRA and Keogh plans, the member normally has a wide choice of investments such as stocks, mutual funds, bonds or strips to hold inside the shell.

If an individual wishes to take the benefit in the form of an immediate annuity he/she may use the IRA/Keogh assets to purchase an annuity in the market. In this case, income tax is payable on the annuity payments not when the cash is released from the IRA to the annuity provider.

B.1.1.4 Annuities

There are differences in terminology between the US and the UK. In the US, an annuity is a tax-deferred investment vehicle packaged as an insurance product. Within an annuity package the investment earnings are tax-deferred until the money is withdrawn. Thus money invested in an annuity grows faster than in a taxable account. Contributions to an annuity are not tax deductible. There are no limits to the amounts that can be contributed to an annuity.

An annuity has two phases: the accumulation phase and the distribution phase. During the accumulation phase, individuals can contribute as much as they wish and the earnings grow tax deferred. During the distribution phase, individuals can elect to receive a *lump sum* or can 'annuitize' which means that the annuity can be turned into a series of payments for a specified period. There are few, if any, restrictions on the series of payments that are possible.

There are many common permutations, some examples of which are set out below:

1. The single life annuity provides highest annuity payment per invested dollar but ends at death.

2. A 'life and "n" year' annuity provides that in the event of an early death, payments continue to a beneficiary for the remainder of the n years.

3. A 'revocable' annuity lets the individual exchange the remaining income payments for a lump sum at any time on period-certain contracts (not lifetime).

Fixed immediate annuities provide a set return backed by an insurance company. Variable Immediate Annuities (VIAs) are tied to an underlying equity-based account. In return for a one off payment, an annuity is guaranteed for life, but payments are adjusted in line with the equity account performance. However, VIAs are not very popular compared with fixed immediate annuities.

Distributions and withdrawals from annuities are generally taxed as income. In broad terms, annuities in the US are similar to a traditional IRA except that contributions are not tax deductible.

B.1.2 Role of annuities in the US pension system

In the US pension system, there is no compulsion from the State for retirement income to be received in the form of income from annuity arrangements. There is a great deal of

freedom regarding the manner in which income can be received in retirement. To a large extent individuals are able to choose arrangements that suit their own particular circumstances and attitudes. It should be noted that this does not preclude the choice of an immediate annuity as the market for annuities is fairly well developed.

Within this system there is the possibility of individuals taking the proceeds of their pensions arrangements as a lump sum and rapidly spending the money. Generally this would not cause a problem for the State as most individuals who would have been in a position to amass substantial private pension funds would also be entitled to a non means tested State pension which be sufficient to prevent them from claiming means tested State benefits.

B.2 Australia[42]

B.2.1 Background

B.2.1.1 The State system

Australia operates an Age Pension funded through general revenues at age 65 (61 for women but this is being raised progressively to 65). The pension is means tested and not universal. Australia has never operated an earnings related pension system. The Age Pension pays 25% of average male workers' weekly earnings and is adjusted twice per year.

B.2.1.2 Employer plans

In 1992, the government mandated employers to make contributions to pension (or superannuation) schemes. Currently the contribution rate is 7% (and being increased in steps to 9% by 2002) of employee earnings. The amounts are fully vested and fully portable. The schemes are compulsory, except for lower paid employees who can opt out of the scheme and receive higher wages.

The employer offers the employee a choice of funds. Investments are not controlled by the employee. The large majority of schemes are defined contribution. The superannuation funds are taxed. All contributions, earnings (unless tax has been paid by the dividend issuer) and capital growth is taxed.

Withdrawal can occur after reaching age 55 (moving to 60 by 2025). The withdrawal may be by lumps sum or by annuity. There are no stipulated limits. An individual can take the money out all at once and spend it before age 65 and be eligible for the means tested Age Pension, a practice known as 'double dipping'. The minimum age for withdrawals is being increased to 60 is to reduce the scope for double dipping. Annuity income and lump sum withdrawals are taxed above a threshold amount.

B.2.2 Role of annuities in the Australian pension system

The market for 'for life' annuities in Australia is small at the moment. Only 2% of retirees were receiving income from annuities in the 1992-93 fiscal year. Most annuity sales are fixed term and only 16% of annuity sales in 1997 were 'life long'.

A more popular alternative to annuities is what is known as 'allocated pensions' which somewhat resemble an income drawdown product in the UK. Assets typically can be invested in a wide variety of funds and are then used up over time according to the remaining life expectancy of the drawer. The maximum withdrawal rate is that which will exhaust the account by age 80, after which the Age Pension is available. They are more flexible than annuities because the individual can vary the withdrawal rate if he/she wishes. The schemes do not protect against the risk of outliving the assets. If an individual does outlive them, they are still eligible for the means tested Age Pension.

In summary, there is no State compulsion to purchase annuities in Australia. Individuals have considerable freedom over how to use their retirement funds. Although a reasonable range of annuity products exists, annuities are not generally a popular choice. The Australian system does, however, face considerable difficulties caused by people exhausting their retirement funds and then falling back on the State and the government is taking action to address this problem.

B.3 Ireland[43]

B.3.1 Background

B.3.1.1 The State system

Ireland operates a universal scheme without means testing. Pensions are payable from age 66. The State pension is currently equal to 29% of average industrial earnings.

B.3.1.2 Occupational schemes

In 1995, 52% of employees are covered by occupational schemes, but 75% of schemes do not allow part-timers to join. There is a growing trend towards defined contribution schemes, but currently only about 10% of schemes are defined contribution. Many schemes have vesting periods of five years, the present statutory maximum.

B.3.1.3 Personal pensions

Only 27% (1995) of the self employed have personal pension plans.

Proposals are underway for a 'Personal Retirement Savings Account' (PRSA). This would be available to all individuals irrespective of employment status and would be fully portable. A deferral option would be permitted allowing for the investor to enter into a drawdown arrangement, and thus postponing the decision to buy a life annuity. However, annuities must be purchased by age 75 at the latest.

Up to 25% of accumulated PRSA funds (up to a maximum of £25,000) can be used as collateral for taking out loans, analogous to 401(k) plans in the USA.

B.3.2 Role of annuities in the Irish pension system

Until recently, defined contribution scheme members and the self-employed had to purchase an annuity contract immediately on retirement: up to 25% could be taken as a lump sum. But annuities came to be perceived as poor value as long term interest rates declined.

The annuity market in Ireland is characterised by lack of competition and a narrow range of products. Only one company offers a with-profits annuity. Index-linked annuities are not available as no index-linked bonds have been issued by the Irish government.

The Irish Pensions Board has proposed that pension scheme members be able to defer the purchase of annuity until age 75. For example, an individual could buy an interim term annuity which gives taxable income for 5 years, plus the return of capital at the end. The capital then has to be used to purchase a 'for-life' annuity (or another temporary annuity if the individual is less than 75).

The 1999 Finance Act introduced elements of these proposals but only for the self-employed and owner directors. The retirement options are:

1. Take up to 25% of the value of the fund as a lump sum and also purchase an annuity.

2. Take the 25% lump sum and invest the rest in an Approved Retirement Fund (ARF). Unless an individual has other income of at least IR£10,000pa (or is already 75), he/she must deposit IR£50,000 (or the total if less) of his/her fund in an Approved Minimum Retirement Fund (AMRF) or purchase an annuity at once. ARFs and AMRFs can consist of deposits, life funds, unit trusts, individual shares or property. Monies in an ARF can be withdrawn at any time. Drawdown withdrawals are taxed at the marginal rate of income tax. Monies placed in an ARMF may not be withdrawn until age 75.

3. Take the 25% lump sum and 75% the balance as a taxable cash payment. However, again, if the investor does not have an income of at least IR£10,000 he/she must put IR£50,000 in an AMRF or an annuity.

In summary, the Irish system has changed from a system, similar to that in the UK, in which the self-employed were compelled to purchase an annuity on retirement. This compulsion to purchase annuities has been removed allowing individuals some discretion over how to deal with the proceeds of their pension funds. The new system has introduced measures to ensure that individuals without sufficient alternative income cannot exhaust their funds too quickly.

B.4 Chile[44]

B.4.1 Background

B.4.1.1 Replacement of a State system by a private system

In 1981, Chile replaced a State pay-as-you-go system with a private system based on individual accounts. Workers must save in personal retirement accounts and contribute to disability and survivor insurance. The responsibility is the employee's. In a one-off step, what used to be the employer's contribution is transferred to the employee as income so the employee could, in turn, save it in his/her pension scheme.

The system is mandatory for all new joiners to the workforce and voluntary for existing workers. To recognise the fact that existing workers had previously paid into the State system to date, they were given 'recognition bonds' which the Government will honour within their personal retirement accounts when they retire.

Contributions equal 10% of wages. All contributions are tax deductible. They are voluntary for the self-employed. Contributions are invested with a private pension firm. Individuals may switch firm every 4 months. The firm must arrange disability and survivor cover. Investments can be in bank deposits, government securities, equity, corporate bonds, or real estate. Each investment type within the portfolio is subject to percentage limits of the whole.

The credited return on the fund is prohibited from diverging by more than 2 percentage points from the average return for all funds. Excesses are placed in a 'profitability reserve' portfolio and credited back into the fund during lean years.

Withdrawals at retirement take the following forms: the individual may either buy a life annuity or make periodic drawdowns on the basis of a defined schedule acceptable to the

government, based on life expectancy and interest rates. Income is taxable. Individuals can take a lump sum only if the account balance is greater than required to buy a pension of 70% of average salary and at least 120% of the Minimum Pension.

If individuals have been members of a scheme for 20 years and still have insufficient funds, the government will top-up their scheme to enable them to buy a Minimum Pension. The Minimum Pension is now 25% of average income (about 75% of the minimum wage).

B.4.2 Role of annuities in the Chilean pensions system

Annuities sold in Chile must be index linked and provide survivor benefits. Retirees are free to choose an annuity in the open market. Annuity providers may not act as individual pension account providers. Providers are regulated and the government has an annuity guarantee scheme if annuity providers default.

In summary, in the Chilean pension system there is no State compulsion to purchase annuities. Individuals may take a lump sum withdrawal from their accumulated pension funds after securing an appropriate pension. This pension may be secured by means of an annuity or by making periodic drawdowns on a schedule acceptable to the government.

B.5 Singapore[45]

B.5.1 Background

Unlike most other countries that finance their social security systems on a pay-as-you-go basis, Singapore requires its working citizens to save for their own retirement through a mandatory publicly managed savings programme known as the Central Provident Fund (CPF).

Most employed Singaporean citizens are required to be members of the CPF. Fund accounts belong to individual members and are portable, remaining with the employee through job changes and forming part of the account holder's estate on death.

Both employees and employers make monthly contributions to the fund. The total contribution rate for workers up to the age of 55 is 30%, 20% from the employee and 10% from the employer. Until recently, total contribution levels were 40% split equally between employee and employer, but, due to the recent economic turmoil in Asia, the employer's contribution level has been reduced to 10% for a period of two years.

CPF contributions are only levied on salaries up to a ceiling of S$6,000 per month. Contribution levels vary from zero, for low paid employees (those earning up to S$200 per month) up to the full 20% employee contribution rate for employees earning over

S$363 per month. In order to encourage employees to work for as long as possible, contribution levels are reduced for those over 55.

CPF contributions are credited to three accounts:
1. Ordinary account: can be used for retirement, buying a home, insurance, investment and education.

2. Medisave account: can be used to pay hospital bills and approved medical insurance.

3. Special account: reserved for old age and contingencies.

Contributions to the CPF earn market-related interest rates based on the 12-month fixed deposit and month-end savings rates of four major local banks. Since 1986, members of the CPF have been able to invest a proportion of their accumulated funds into equities and other approved investments in order to maximise investment returns.

Deposits and withdrawals from the fund are tax-exempt as are gains within the fund.

B.5.2 Role of annuities in the Singaporean pension system

Members can withdraw their CPF savings when they reach 55, after setting aside a minimum sum in their Retirement Account for old age. As at 1 July 1999, this was set at S$60,000 but it is gradually being increased to S$80,000 by 2003. Couples need only set aside 1.5 times the minimum sum, providing each is named beneficiary on death.

In practice, two thirds of CPF members reaching age 55 have accounts exceeding the minimum sum and most participants withdraw the excess funds to invest in higher yielding investments.

The minimum sum can be used in three ways:

1. To buy a life annuity from an approved insurance company.

2. It can be deposited with an approved bank.

3. It can be kept in a Retirement Account with the CPF from which an income would be received.

Income payments from the above options begin at 60 and only the option of the life annuity guarantees income for life. Payments from approved banks or the CPF board only continue until the minimum sum is used up.

Individuals are expected to make proper use of any surplus funds withdrawn from their CPF account in order to provide for a comfortable retirement. In this way, they remove the financial burdens of retirement and old age from the State.

In summary, there is no State compulsion to purchase an annuity. Individuals may take withdrawals from their CPF savings after setting aside a minimum sum. Purchasing an annuity is one of three options for investing the minimum sum.

B.6 Continental Europe

B.6.1 Background

In general terms most countries in continental Europe provide generous State pensions. Except for Holland and Switzerland and to a lesser extent the Scandinavian countries, funded private pension plans did not begin in the Continental countries until the late 1990s.

Individuals do have the discretion to augment their retirement income by purchasing annuities. There is generally a reasonably active market in annuities, despite the fact that private funded pension plans are a recent phenomenon. Annuities in continental Europe are designed using methods quite unlike those used in the UK as discussed below.

B.6.2 Annuities in Continental Europe[46]

Annuities in many Continental European countries are priced on a 'technical rate' basis, a legacy of the old tariff-based insurance system where prior approval of premiums was required from the supervisory authority. The annuity price is calculated using a discount rate equal to the technical interest rate. The initial annuity payment is revalued in subsequent years by an amount equal to the excess of the insurer's actual declared rate of return obtained on its general fund (less expenses) over the technical rate. The annuities are therefore effectively 'with profits'.

The maximum interest rate is set by legislation, and is effectively the rate of return which is guaranteed in advance by the insurer. In other words, if the actual declared rate of return less expenses is equal to the technical rate, the annuity payment remains the same from one year to the next; and if it is less than the technical rate, the annuity payment is not reduced and the strain is borne by the insurer.

The underlying investments are generally bonds, so the returns are stable if unexciting. The gross returns declared are typically the insurer's general with-profits bonus rates (with-profits policies are generally more prevalent than in the UK), so the rate at which the annuity payments are revalued is the difference between the with-profits bonus rate and the technical interest rate. Within the EU, the Third Life Insurance Directive calls for a maximum guaranteed (i.e. technical) interest rate equal to 60% of the long bond yield, allowing a safety margin so that annuities will be able to be revalued (upwards) each year. The interpretation of this directive into local legislation, and the circumstances in which exemptions are allowed, vary from country to country. Such a safety margin has not

existed in recent years in countries such as Japan where insurers have been unable to obtain the investment returns to cover their interest rate guarantees.

It is therefore not possible to buy fixed rate (non-increasing) annuities in these markets; prospective purchasers accept that their annuities will be revalued in some way (and are generally astonished to learn that this often does not happen in the UK). Comparison of annuities at point of purchase is difficult: purchase prices are all very similar (differences mainly being due to expenses), but the products are not all the same unlike in the UK: after, say, 5 years, an annuity of 1000 euros per year bought from insurance company A will have been revalued to a different amount than an annuity of 1000 euros per year bought from insurance company B.

Also, index-linked annuities are not sold, as index-linked bonds to back the annuities are not issued (except for a small recent issue in France).

Prices of annuities do not generally change every year as they do in the UK. Instead, there are 'step changes' when the technical interest rate changes (e.g. from 4.75% to 3.25% as recently happened in Belgium, or 4.5% to 3.5% as happened several years ago in France).

The other factor affecting the price of annuities is mortality. In these markets, another legacy of the old tariff-based insurance pricing system is that insurance companies in each market use the same mortality table. When this is changed (as in 1998 in Germany, or several years ago in France) there is a 'step change' in the price of the annuity.

Appendix C – Decomposition of Annuity Loads.

It is possible to decompose the loads (or charges) on annuities extracted by life companies into the following components using estimates derived by Finkelstein and Poterba (1999, hereafter FP): a component arising from the selection risk associated with the type of people who purchase annuities, a component arising from the additional risk associated with the type of people who purchase annuities in the voluntary market, a component arising from escalation risk, and a component that covers administration costs and profit to the insurance company. It is also possible to identify a size effect, an age effect and a sex effect.

The basis for FP's analysis is the money's worth of an annuity which is defined as the ratio of the expected present value (*EPV*) to the premium, where the *EPV* is defined as:

$$(C.1) \qquad EPV = \sum_{t=1}^{T} \frac{A(1+\pi)^t S_t}{\Pi_{k=1}^{t}(1+r_k)} \times 100$$

where:

A = nominal initial annuity payment

π = escalation factor (zero for level annuity)

r_k = nominal spot yield for year k derived from the government bond spot yield curve

T = maximum length of pension based on the assumption that no one lives beyond age 112

S_t = probability that the annuitant survives t years.

FP derive estimates of (C.1) based on three different sets of single-life mortality tables: the population mortality tables provided by the Government Actuary's Department, and the mortality tables for voluntary and compulsory annuitants provided by the Institute of Actuaries' Continuous Mortality Investigation Bureau. The latter two sets of tables are the IM80 and IF80 tables for voluntary purchase male and female life annuities and the PM92 and PF92 tables for the compulsory purchase male and female life annuities that must be bought when someone retires from a personal pension scheme. These tables are based on the mortality experience of these two select groups around 1980 and 1992 respectively, and have been adjusted to account for mortality improvements since that period.

If an annuity is fairly priced, its money's worth would be 100%. In practice though it will be less than this because of the charge components outlined above. FP use data provided by Annuity Direct and Moneyfacts for August and November 1998, respectively: they analyse the money's worth of an immediate single life annuity with monthly payments and a premium of £10,000. Their decomposition is presented in Table C.1.

Take for example the case of a 65-year old male and a level annuity. This pays £879.70 in the compulsory purchase market and £844.40 in the voluntary open market, the difference reflecting the greater life expectancy of those who purchase annuities on a voluntary basis over those who are required to do so as part of their pension scheme (we denote this component of charges the volunteer premium). The total implied charge is 10.3% of the purchase price in the compulsory market and 13.5% in the voluntary market. This is found as follows: calculate (C.1) using the population mortality table with A = £879.70 for the compulsory annuity and £844.40 for the voluntary annuity, divide this by the purchase price (£10,000) to give the money's worth, which is then subtracted from 100%. Using population mortality to calculate (C.1) is equivalent to assuming the longevity experience of a typical member of the population as a whole.

If, using population mortality, the money's worth is below 100%, this implies that there are additional longevity risks associated with the select group of the population who

purchase annuities; we must also make an allowance for the insurance company's administration costs and profit. We quantify these additional risks and costs as follows.

The selection premium covers the additional longevity risk of someone who purchases an annuity in comparison with a typical member of the population at large of the same sex and age. The selection premium associated with compulsory annuities is 4.7%: it is measured as the difference in money's worths calculated using (*C*.1) based on compulsory mortality tables and (*C*.1) based on population mortality tables. So even though members of personal pension schemes have no choice about whether or not to buy an annuity, they as a group experience sufficiently lighter mortality than the population as a whole that insurance companies need to charge 65-year old men a premium of 4.7% to cover this additional risk. The selection premium with voluntary annuities is, at 4.6%, of a similar order of magnitude.

Since those who buy annuities voluntarily experience even lighter mortality than personal pension scheme members, insurance companies charge such purchasers an additional volunteer premium. This is calculated as the difference between the money's worth in the voluntary market using the voluntary mortality table and the money's worth in the voluntary market using the compulsory mortality table. For a 65-year old male, the volunteer premium is 4.2%.

The table also reports evidence of a size effect in annuity provision and two countervailing influences are apparent. The first is a scale effect: the cost of administering an annuity is independent of its size, so that insurance companies should be willing to pass scale economies onto high-valued policy holders. The table shows that this happens, although evidence is only available on compulsory level annuities: the charge is 1.3 percentage points lower for a 65-year old man when the purchase price is £50,000 than when it is £10,000. The second effect is a wealth effect: richer people tend to live longer than poorer people, and this should be reflected in a higher longevity premium. This effect begins to dominate the scale effect on annuities over £50,000: there is a small increase in charges of 0.2 percentage points as the policy size rises from £50,000 to £100,000.

We can assess the importance of the age effect by comparing these results with those relating to a male aged 70. There are two factors to consider: an older man has on average fewer remaining years than a younger man, but, because he has survived to a greater age than the younger man and so has greater total life expectancy, the difference in remaining years will be greater than their age difference. The first factor will result in a higher annuity for the older man than for the younger man, but this will be partly counteracted by the second factor: the risk that an annuitant will live a very long time increases with the age at which he purchases the annuity (see, e.g., Brugiavini (1993)). The second panel of the table shows that a 70-year old man receives an annuity that is 18% higher than that for a 65-year old man in both the compulsory and voluntary level markets. However, the total charges for the 70-year old are nearly 3 percentage points higher in each market. The selection premium remains the same in both markets, but the

volunteer premium is 2.4 percentage points higher. We can interpret the figure of 2.4% as the age premium and note that, in the case of 65 year old men, the age premium is present only in the voluntary market, not the compulsory market. A size effect is also present, although the orders of magnitude differ slightly in comparison with the 65-year old male.

The final effect that we can identify is a sex effect: women tend to live longer than men and this is reflected in the size of the annuity they are offered for a given premium. A 65-year old women receives a level annuity that is 13-14% lower than that of a 65-year old man, while a 70-year old woman receives broadly the same annuity as a 65-year old man. The level and pattern of charges differs however. The total charge for men is generally higher than for women in the compulsory market, but lower in the voluntary market. Both the selection and volunteer premiums are lower for women than for men. There is a positive age premium in the voluntary market, but at 1.2% it is only half that for men, while in the compulsory market, the age premium is negative (-0.1%): the age premium is the difference between the sums of the volunteer, selection and escalation premia at age 70 and 65 years respectively. The wealth component of the size effect is larger for women than for men (0.5 compared with 0.2 at age 65 and 0.6 compared with 0.3 at age 70).

The initial annuity payment with a 5% escalating annuity is 37% lower than for a level annuity for a 65-year old man in the compulsory market and 38% lower in the voluntary market. It takes 10 years for the escalating annuity to catch up with the level annuity and 19 years before the total cash payments under the two policies are equalised. In the case of a 65-year old woman, the initial payment from the escalating annuity is 42% lower for both the compulsory and voluntary markets. It takes around 12 years for the two cash amounts to equalise and a further 10 years before the total cash payments equalise.

The total implied charge is higher for escalating annuities than for level annuities. This is because both the volunteer and selection premia are higher and there is an additional escalation premium to take into account. The escalation premium covers a type of longevity risk that arises from the backloading of payments with escalating annuities: if the annuitant lives longer than anticipated, the additional payments will be rising with the escalating annuity but remain constant with the level annuity. It is calculated as the difference between the money's worths of the level and escalating annuities, each evaluated using own-market mortality tables. The escalation premium varies between 1.6 and 2.6% for men and between 3.1 and 3.5% for women.

To illustrate in the case of a 65-year old man, the volunteer premium is 6.5% with the escalating annuity and 4.2% with the level annuity. The selection premium is 6.4% compared with 4.7% in the compulsory market and 6.1% compared with 4.6% in the voluntary market. In comparison, with a 65-year old woman, the volunteer premium is 4.7% with the escalating annuity and 3.2% with the level annuity. The selection premium is 3.0% compared with 1.9% in the compulsory market and 2.9% compared with 1.9% in the voluntary market. The age premium is smaller for both men and women in the

compulsory market (at 0.1% and 0.2% respectively) than in the voluntary market (at 1.4% and 0.9% respectively).

The allowance for administration costs and profit is calculated as the difference between the total implied charge and the sum of the volunteer, escalation and selection premia. In the level market, this is also equal to the difference between an actuarially fair annuity and the money's worth of an annuity using the own-market mortality table (e.g., 100 - 94.4 for the compulsory level annuity for a 65-year old male). With escalating annuities, the escalation premium must be subtracted from this figure. The consequence of calculating the administration costs and profit in this way is that the profit margin (assuming identical administration costs across products) is the same in the level and escalating markets for each class of product (compulsory or voluntary) and for each class of annuitant. An alternative definition of administration costs and profit in the case of escalating annuities would be the same as that for level annuities: the difference between an actuarially fair annuity and the money's worth of an annuity using the own-market mortality table. The profit margin would be higher than with the first definition, but would also now contain an allowance for escalation risk.

Apart from this, we find that: compulsory annuities are generally more profitable than voluntary annuities, reflecting the fact that the compulsory market is a captive one, that female annuities are more profitable than male annuities and that the profit margin rises with age, especially in the compulsory market.

Table *C*.1 Decomposition of Loads on Annuities with £10,000 Purchase Price				
	Level		*Escalating at 5%*	
	Compulsory	*Voluntary*	*Compulsory*	*Voluntary*
Male aged 65				
Initial annuity payment (£)	879.70	844.40	550.20	522.90
Total implied charge (%)[a]	10.3	13.5	14.2	19.6
composed of:				
Volunteer premium (%)[b]	-	4.2	-	6.5
Escalation premium (%)[c]	-	-	2.2	2.3
Selection premium (%)[d]	4.7	4.6	6.4	6.1
Administration cost and profit[e]	5.6	4.7	5.6	4.7
Size premium[g]:				
£10,000 to £50,000	-1.3	NA	NA	NA
£50,000 to £100,000	0.2	NA	NA	NA
Male aged 70				
Initial annuity payment (£)	1036.10	992.80	703.70	670.40
Total implied charge (%)[a]	13.1	16.3	17.1	21.4
composed of:				
Volunteer premium (%)[b]	-	6.6	-	8.9
Escalation premium (%)[c]	-	-	2.6	1.6
Selection premium (%)[d]	4.7	4.6	6.1	5.8
Administration cost and profit[e]	8.4	5.1	8.4	5.1
Age premium[f]	0.0	2.4	0.1	1.4
Size premium[g]:				
£10,000 to £50,000	-0.6	NA	NA	NA
£50,000 to £100,000	0.3	NA	NA	NA
Female aged 65				
Initial annuity payment (£)	768.50	727.60	445.4	420.3
Total implied charge (%)[a]	9.9	14.7	14.1	20.7
composed of:				
Volunteer premium (%)[b]	-	3.2	-	4.7
Escalation premium (%)[c]	-	-	3.1	3.5
Selection premium (%)[d]	1.9	1.9	3.0	2.9
Administration cost and profit[e]	8.0	9.6	8.0	9.6
Size premium[g]:				
£10,000 to £50,000	-1.4	NA	NA	NA
£50,000 to £100,000	0.5	NA	NA	NA

Female aged 70				
Initial annuity payment (£*A*)	885.20	843.50	560.80	532.10
Total implied charge (%)[a]	12.7	16.7	17.2	22.4
composed of:				
Volunteer premium (%)[b]	-	4.5	-	5.9
Escalation premium (%)[c]	-	-	3.4	3.4
Selection premium (%)[d]	1.8	1.8	2.9	2.7
Administration cost and profit[e]	10.9	10.4	10.9	10.4
Age premium[f]	-0.1	1.2	0.2	0.9
Size premium[g]:				
£10,000 to £50,000	-1.0	NA	NA	NA
£50,000 to £100,000	0.6	NA	NA	NA

Source: Calculations based on the averages from a sample of 9 insurance companies reported in Tables 2, 7 and 12 of Finkelstein and Poterba (1999).

Notes:

a The difference between an actuarially fair annuity (100%) and the money's worth of the annuity using the population mortality table (e.g., 100 – 89.7 for the level compulsory annuity for a 65-year old male).
b For voluntary annuities only, the difference between the money's worth of the annuity using the voluntary mortality table and the money's worth using the compulsory mortality table (e.g., 95.3 – 91.1 for the level voluntary annuity for a 65-year old male).
c For escalating annuities only, the difference between the money's worths of the level and escalating annuities, both evaluated using the own-market mortality table (e.g., 94.2 – 92.2 for the compulsory annuity for a 65-year old male).
d The difference between the money's worth of the annuity using the own-market mortality table and the money's worth using the population mortality table (e.g., 94.4 - 89.7 for the level compulsory annuity for a 65-year old male).
e The difference between the total implied charge and the sum of the volunteer, escalation and selection premia.
f The difference between the sums of the volunteer, escalation and selection premia at age 70 and 65.
g The difference in money's worth between the lower and higher valued annuities, both evaluated using population mortality tables (e.g., 89.7 – 91.0 for the £10,000 and £50,000 annuities for a 65-year old male).

Appendix D - Mortality Drag

The size of an annuity depends on the following factors: the return on the assets purchased with the capital sum (principally government bonds), life office expenses, the degree of escalation, the benefits payable on death and the assumption made about the mortality experience of annuitants, both concerning the average life expectancy of annuitants and the anticipated distribution of life expectancies (ie, the proportion of annuitants expected to die after one year, after two years, etc.). If the assumptions made about these factors are realised in full, the insurance company will have exactly enough resources to meet every annuity payment due. On the death of an annuitant, the balance of the original capital fund, together with investment returns (collectively called the 'mortality profits'), is used to make payments to surviving annuitants. Each annuity instalment has three components: a proportion of the original purchase price, a proportion of the investment return, and a proportion of the assumed mortality profit released by the early deaths of annuitants.

In contrast, with drawdown, there is no mortality cross-subsidy from those with below-average mortality to those with above-average mortality: every user of a drawdown facility bears his or her own longevity risk. The absence of the mortality cross-subsidy is known as 'mortality drag'. For drawdown to be worthwhile, the returns on the invested funds must exceed the annuity yield by a sufficient margin to cover both the mortality drag and the higher charges of drawdown. The mortality drag will be higher for older than for younger people: older people are more likely to die than younger people and also there will be fewer of them, so that the cross-subsidy will be larger and received sooner than for younger people. It will also be higher for men than for women for a similar reason: men tend to die younger than women and relatively there are fewer of them at each given age. However, the benefit of drawdown is its greater flexibility over the timing of the purchase of the annuity and the higher value of the fund if the annuitant dies early.

Example of additional return needed to cover mortality drag and drawdown charges[47]

Male retiring between 60 and 74, assuming an initial drawdown charge of 3%, an annual charge of 0.5%, an annuity yield of 7.5% and an annuity purchased at age 75

Age at retirement	*Mortality drag (%)*	*Charges (%)*	*Additional total return required (%)*
60	1.4	1.8	3.2
61	1.5	1.8	3.3
62	1.6	1.8	3.4
63	1.7	1.9	3.6
64	1.9	1.9	3.8
65	2.0	2.0	4.0
66	2.3	2.0	4.3
67	2.5	2.1	4.6
68	2.8	2.2	5.0
69	3.2	2.3	5.5
70	3.5	2.5	6.0
71	3.6	3.0	6.6
72	3.7	3.5	7.2
73	3.9	4.6	8.5
74	4.1	8.4	12.5

If the man retires aged 60, and makes use of the drawdown facility until age 75, when he purchases an annuity, he will require an additional return on his investments of 1.8% pa to compensate for the higher charges of drawdown and 1.4% pa to compensate for mortality drag. Given that the annuity yield is assumed to be 7.5% pa, this implies that the total return on investments must exceed an average of 10.7% pa between ages 60 and 75 for the benefits of drawdown to exceed those of purchasing the annuity. If this return is not achieved, either the fund will be depleted more rapidly than anticipated or the income withdrawn would have to be lower than that available from the purchase of an annuity at age 60. The additional total return required increases with age of retirement.

Appendix E - The Effect of Inflation on Annuities

We often hear people say, because annuity rates have fallen dramatically since 1990 to their lowest rate for 30 years, that annuities are now very poor value for money. But is this really the case? The answer depends on the accuracy of the market's forecasts of future inflation embodied in the long-term nominal yields on government bonds and therefore in the quoted rates for level annuities. If inflation is fully anticipated, then quoted level annuity rates will fall if the inflation rate in the future is expected to fall, but there will be no reduction in the real value of the annuity compared with that offered when the inflation rate was expected to be higher. Those who believe that the real value of an annuity must have fallen just because the quoted annuity rate has fallen are suffering what is known as 'money illusion'. Certainly it is true that the real value of the payments on level annuities sold at the beginning of the 1990s was higher than the real value of the payments on level annuities sold at the beginning of the 2000s (and costing the same), but that is because there has been an unexpected fall in the inflation rate over the period which has benefited those who purchased level annuities at the beginning of the 1990s. But even if inflation is fully anticipated, the level of inflation will influence the timing of the real payments made by the annuity. The higher the level of inflation, the earlier in time that the real payments on a level annuity are received: this is known as the 'front-loading' of inflation. This appendix examines these issues in more detail.

E.1 Fully anticipated inflation

E.1.1 Money illusion

The nominal interest rate is related to the real interest rate and the expected inflation rate through a relationship known as the Fisher equation (see Blake (2000, chapter 2)):

$$(E.1) \qquad (1+r) = (1+\rho)(1+\pi^e)$$

where:

r Nominal interest rate
ρ Real interest rate
π^e Expected inflation rate.

If the inflation rate is fully anticipated then the actual inflation rate (π) will equal the expected inflation rate (π^e).

Let us consider an index-linked annuity in which the initial annual payment (d^r) is uprated annually by the actual rate of inflation in order to preserve its real value. Suppose

that the annuitant will live for *T* years. The purchase price of this annuity is given by the present value of the future cash payments (see Blake (2000, chapter 3)):

$$(E.2) \qquad P = \frac{d^r(1+\pi)}{(1+r)} + \frac{d^r(1+\pi)^2}{(1+r)^2} + \ldots + \frac{d^r(1+\pi)^T}{(1+r)^T}$$

$$= \frac{d^r(1+\pi)}{(1+\rho)(1+\pi^e)} + \frac{d^r(1+\pi)^2}{(1+\rho)^2(1+\pi^e)^2} + \ldots + \frac{d^r(1+\pi)^T}{(1+\rho)^T(1+\pi^e)^T}$$

$$= \frac{d^r}{(1+\rho)} + \frac{d^r}{(1+\rho)^2} + \ldots + \frac{d^r}{(1+\rho)^T}$$

$$= \frac{d^r(1-(1+\rho)^{-T}}{\rho}$$

Because inflation is fully anticipated, the terms in π and π^e cancel out and the value of the annuity depends only on the real discount rate (ρ) (apart from the duration term (*T*) and the level of the annual payment (d^r)). The real value of the annuity will fall if the real annuity rate falls but not if the nominal annuity rate falls, so long as inflation is fully anticipated. Equivalently, we would expect to see the nominal annuity rate fall if the expected inflation rate falls, but if inflationary expectations are realised in full, then this will not reduce the real value of the annuity. In this case there will be no money illusion.

E.1.2 Front-loading of inflation

However, the nominal value of the annuity payment does depend on the nominal interest rate and therefore on the rate of inflation. Consider now a level annuity paying a fixed amount *d* per year for *T* years. The purchase price of this annuity is given by:

$$(E.3) \qquad P = \frac{d}{(1+r)} + \frac{d}{(1+r)^2} + \ldots + \frac{d}{(1+r)^T}$$

$$= \frac{d(1-(1+r)^{-T})}{r}$$

For a given purchase price *P*, the annual annuity payment (*d*) increases with the nominal interest rate (*r*):

$$(E.4) \qquad d = \frac{rP}{1-(1+r)^{-T}}$$

Table *E*.1 illustrates this result. Suppose that the real rate of interest is constant at 3%. A purchase price of £100,000 will buy an index-linked annuity with an initial annual payment of £6722 which is found by rearranging equation (*E*.2):

$$(E.5) \qquad d^r = \frac{\rho P}{1-(1+\rho)^{-T}}$$

In practice, the initial annual annuity amount will be less than £6722 to allow for administration costs, insurance company profit and the possibility that the annuitant lives longer than 20 years. The initial sum will be uprated by the realised annual rate of inflation in order to maintain a constant real value of £6722 (in starting year prices) for the full term of the annuity: this is shown in the second column of Table *E*.1.

If instead the individual buys a level annuity, and inflation is expected to be 2% then the nominal return will be 5.06% (from the Fisher equation). Using equation (*E*.4), this implies a level annuity of £8065 per annum for 20 years. The real value of the annuity will fall by 2% per annum and after 20 years, the real value will have fallen to £5536 as shown in the third column of the table. The fourth and fifth columns of the table show that as the expected inflation rate, and hence the nominal interest rate, rises (even though the real rate is unchanged at 3%), the initial annuity payment also rises: with expected inflation at 10%, the first year payment is £14,493, which is 80% higher than the initial payment when the expected inflation rate is 2%. But the real value of the annual payments also fall more rapidly the higher the inflation rate. With expected inflation at 10%, the real terminal value of the annuity is £2370, which is 57% lower than real terminal value when the expected inflation rate is just 2%. Fig. *E*.1 presents the same information in graphical form.

The table and graph clearly show the front-loading effects of inflation: the higher the level of expected inflation, the more the real value of the annuity payments are concentrated at the beginning of the period.

E.2 Unanticipated inflation

Table *E*.1 and Fig. *E*.1 show that the distribution over time of the real value of the payments on an annuity depends on the inflation rate. But so long as inflation is fully anticipated, the total value of each of the four annuities considered is identical. Each has the same present value of £100,000: all that differs is the distribution of that present value over time.

Table *E*.1 Real value of annual payments on indexed and level annuities at different inflation rates with a purchase price of £100,000				
	Indexed annuity	*Level annuity*		
Real interest rate	3%	3%	3%	3%
Expected inflation	-	2%	5%	10%
Nominal interest rate	-	5.06%	8.15%	13.30%
Year				
1	6722	8065	10299	14493
2	6722	7907	9809	13175
3	6722	7752	9342	11977
4	6722	7600	8897	10889
5	6722	7451	8473	9899
6	6722	7305	8070	8999
7	6722	7162	7685	8181
8	6722	7021	7319	7437
9	6722	6884	6971	6761
10	6722	6749	6639	6146
11	6722	6616	6323	5588
12	6722	6486	6022	5080
13	6722	6359	5735	4618
14	6722	6235	5462	4198
15	6722	6112	5202	3816
16	6722	5993	4954	3469
17	6722	5875	4718	3154
18	6722	5760	4493	2867
19	6722	5647	4280	2607
20	6722	5536	4076	2370

However, the outcome is different if actual inflation differs from that which was anticipated when the annuity was purchased, as Table *E*.2 shows. Consider again the indexed annuity and the level annuity each having a purchase price of £100,000 when the expected inflation rate is 5%. The indexed annuity makes a year 1 payment of £6722 (column 2), while the level annuity makes a year 1 payment of £10,299 (column 4). Suppose that immediately after the annuity is purchased, the inflation rate falls to 2% and remains at this level for 20 years. The table shows that this unanticipated change has no effect on the real value of the payments with an indexed annuity (column 2). But it dramatically raises the real value of the payments from the level annuity (column 3): the real value of the final payment exceeds that of the indexed annuity. So an unanticipated fall in inflation makes the level annuity a better deal than the real annuity.

The opposite conclusion holds if there is an unanticipated increase in the inflation rate. Suppose that immediately after the annuity is purchased, the inflation rate rises to 10% and remains at this level for 20 years. The table shows that this unanticipated change dramatically reduces the real value of the payments from the level annuity (column 5): the real value of the payments falls below that of the indexed annuity after just 6 years. So an unanticipated rise in inflation makes the level annuity a worse deal than the real annuity. Fig. 2 presents these results in graphical form.

So inflation has the following effects on annuities. If it is fully anticipated, the total real value of the annuity payments will be independent of the level of inflation (no money illusion), although the real value will more heavily concentrated at the beginning of the period the higher the level of inflation (front-loading). If inflation is higher than anticipated, then level annuities will turn out to be poor value for money compared with indexed annuities, while the opposite is true if inflation is lower than anticipated. Individuals who buy level annuities are taking out a bet on whether inflation will be higher or lower than that implied by the payments from an indexed annuity with the same purchase price.

Table *E*.2 Real value of annual payments on indexed and level annuity at different inflation rates with a purchase price of £100,000 when the anticipated inflation rate was 5%				
	Indexed annuity	*Level annuity*		
Real interest rate	3%	3%	3%	3%
Actual inflation	-	2%	5%	10%
Nominal interest rate	-	5.06%	8.15%	13.30%
Year				
1	6722	10299	10299	10299
2	6722	10097	9809	9363
3	6722	9899	9342	8512
4	6722	9705	8897	7738
5	6722	9515	8473	7034
6	6722	9328	8070	6395
7	6722	9145	7685	5814
8	6722	8966	7319	5285
9	6722	8790	6971	4805
10	6722	8618	6639	4368
11	6722	8449	6323	3971
12	6722	8283	6022	3610
13	6722	8121	5735	3282
14	6722	7962	5462	2983
15	6722	7805	5202	2712
16	6722	7652	4954	2466
17	6722	7502	4718	2241
18	6722	7355	4493	2038
19	6722	7211	4280	1852
20	6722	7070	4076	1684

Fig. E.1 Front loading of inflation in annuities

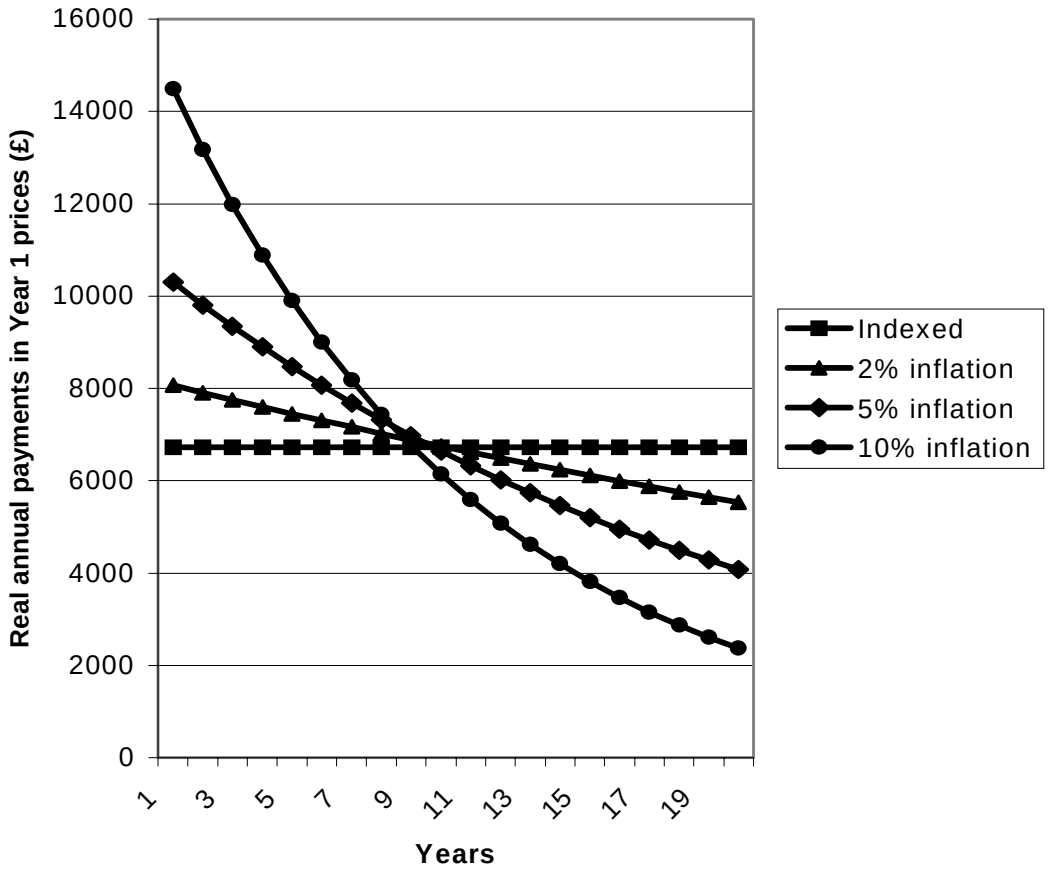
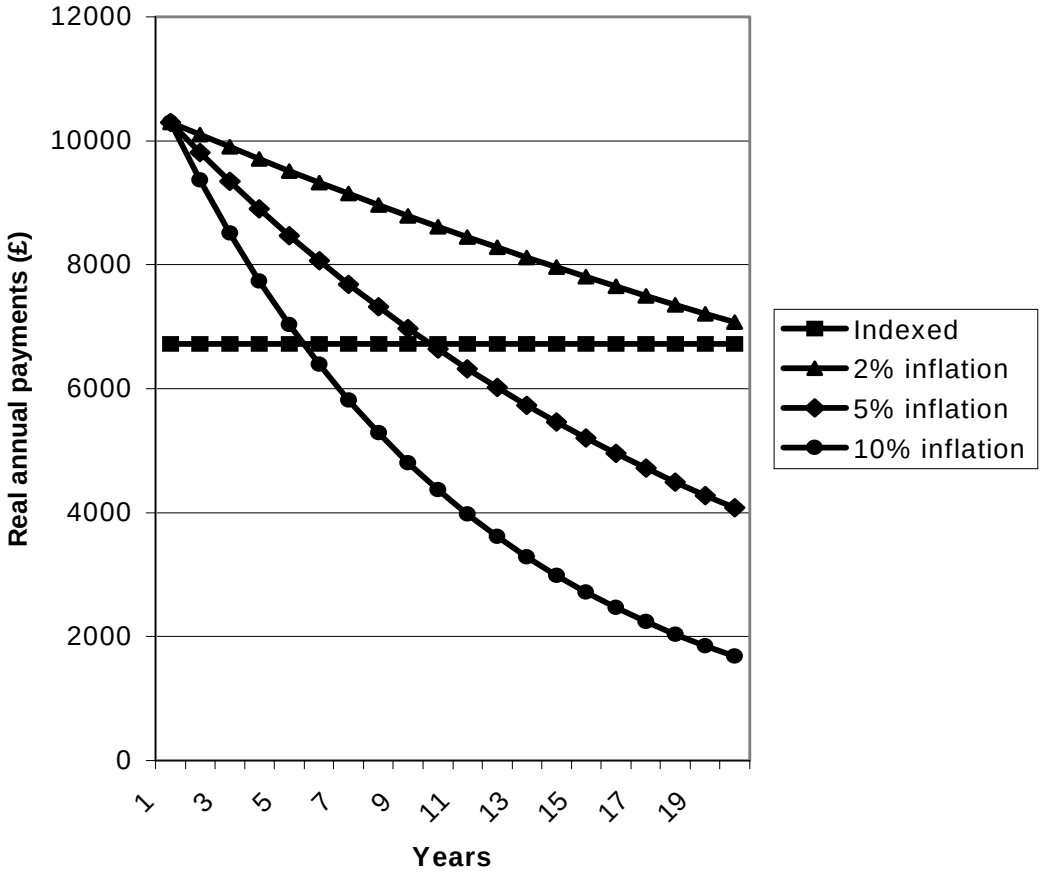


Fig. E.2 Effects of unanticipated inflation



Appendix F - Proportion of Pensioners likely to be affected by the Recommendations

Market research can be used to estimate the proportion of pensioners who might be affected by the recommendations of this Report. The Working Party has been given access to the Aberdeen Asset Management Retirement Income Survey. The sample design of this survey aims to accurately reflect the GB population in terms of region and informant demographics.

In principle, the people who will be affected by the Working Party's proposals are those who will have an income from pensions (i.e. not including other sources of income such as investment income) greater than the MRI, part of which has been obtained from an annuity based product. Information on this group of individuals can be obtained from surveys of existing pensioners and of people who have yet to retire.

F.1 Existing Pensioners

The Aberdeen Asset Management Retirement Income Survey for November 1999 identifies retired individuals obtaining a pension from an annuity-based product by the size of their total pension. This information is summarised in Table *F*.1 below.

Table *F*.1 – Pensioners obtaining a pension from an annuity-based product

Currently monthly pension (£)	*Individuals obtaining a pension in this band as a percentage of all pensioners receiving pensions from annuity-based products (%)*	*Individuals obtaining a pension in this band as a percentage of all pensioners (%)*
Up to 200	13.8	3.7
201 to 300	15.4	4.1
391 to 400	21.5	5.8
401 to 500	21.5	5.8
501 to 750	12.3	3.3
751 to 1000	10.8	2.9
1001 to 1500	4.6	1.2
1501 to 2000	0.0	0.0
Over 2000	0.0	0.0
Number of pensioners surveyed: 500 Pensioners who refused to answer questions about their income or who did not know their income have been excluded in calculating the percentages above.		

Source: Aberdeen Asset Management Retirement Income Survey

The proposed MRI is currently about £560 per month (£140 per week). Table *F*.1 can be used to determine the percentage of pensioners who have a current pension that exceeds this figure. There are, however, some pitfalls in interpreting this to be the percentage of pensioners who will be affected by the recommendations. Any particular pensioner will only be affected by the MRI at the date he retires not at some snapshot date in the future. Both the MRI and pensions in payment tend to increase over time. Part of the MRI is related to the Basic State Pension and this will increase in line with RPI. The remaining portion will increase in line with earnings. Pensions in payment may increase at a variety of different rates, normally at no more than the rate of increase in RPI. Thus pensions in payment will tend to increase more slowly than the MRI, since it rises by more than the RPI. Thus some pensioners who would have had a pension above MRI at retirement will eventually find that their pension falls below the MRI after some years of retirement. It is difficult to make a precise estimate of the effect of these differential increases. To give a rough estimate of the effect one might anticipate that the MRI would perhaps increase by say between 1% and 3% more per annum that the average pension in payment. To take account of this effect, and recognising the bands in which the data is grouped, it is probably a conservative approximation to consider that all the pensioners currently in the £501 to £750 per month pension band and above would have had a pension above the MRI at retirement.

Based on this assumption it can be deduced from column 1 of Table *F*.1 that 27.7% of pensioners receiving pensions from annuity-based products (corresponding to 7.4% of all pensioners (column 2)) would have had a pension above the MRI at retirement.

F.2 Prospective Pensioners

The Aberdeen Asset Management Retirement Income Survey also identifies the value of the pension per month that adults aged 45 and over expect to receive when they retire. This information is summarised in Table *F*.2 below for individuals expecting pension from an annuity-based product.

Table *F*.2 – Adults aged 45 and over but not yet retired expecting a pension from an annuity-based product		
Expected monthly pension (£)	*Individuals expecting a pension in this band as a percentage of all individuals expecting pensions from annuity-based products.*	*Individuals expecting a pension in this band as a percentage of all adults aged 45 and over but not yet retired*
Up to 200	21.3	7.1
201 to 300	19.1	6.4
391 to 400	23.4	7.8
401 to 500	10.6	3.5
501 to 750	10.6	3.5
751 to 1000	8.5	2.8
1001 to 1500	6.4	2.1
1501 to 2000	0.0	0.0
Over 2000	0.0	0.0
Number of individuals surveyed: 444 Individuals who refused to answer questions about their income or who did not know their income have been excluded in calculating the percentages above.		

Source: Aberdeen Asset Management Retirement Income Survey

The percentage of adults aged 45 and over (but not yet retired) who expect to have a pension that exceeds the proposed MRI can be deduced from Table *F*.2. There are some difficulties in interpreting this to be the percentage of individuals who will exceed MRI at retirement. As discussed above, the MRI will increase in future. When estimating their expected pension individuals may or may not fully take into account future investment returns, future contribution increases and future salary and retail price increases. Distortions may arise from comparing an MRI in current prices with estimates of future pensions which may not always be made in current terms. Nonetheless, in the absence of more detailed information it is perhaps reasonable to assume that individuals expecting a pension of over £560 per month will have a pension above the MRI at retirement.

Based on this assumption it can be deduced from Table *F*.2 (with suitable interpolation) that about 23% of adults aged 45 or over receiving pensions from annuity-based products (corresponding to 7.6% of all adults aged 45 or over but not yet retired) would expect to have a pension above the MRI at retirement.

Interestingly, these figures are of the same order of magnitude as for those recently retired. However, we can reasonably expect that these percentages will be somewhat higher in the future as a larger percentage of the population adopt defined contribution pension arrangements.

Appendix G – Assumptions used in Determining the Level of Contributions Required to Provide a Minimum Retirement Income

The following assumptions were used in the projections for Section 6.

G.1 Pension plan membership assumptions

Contributions to start in 2000 when the plan member is 25 years old.
Contributions increase in line with earnings.
Retirement at age 65 in 2040.
No spouse's pension.
No other pension accrued to date.
Basic State Pension for single person payable from the State at retirement age.
Target benefit of £70 per week, in addition to BSP, in 2000 prices and wages.
Benefit will increase in line with earnings pre-retirement.
Benefit will increase in line with RPI post-retirement.

G.2 Deterministic projections

Increase in retail price index (RPI)	2.5% pa
Pre-retirement investment returns in excess of RPI	4.5% pa
Yield for purchasing annuity at retirement in excess of RPI	3.5% pa
Earnings growth in excess of RPI	1.5% pa
Promotional increases	Nil
Career breaks	Nil
Pre-retirement expenses	1% pa of the fund
Pre-retirement mortality	No assumption needed as benefit is assumed to be a return of fund.
Post-retirement mortality:	
Male annuity rates	PMA92 (B=1975)[48]
Female annuity rates	PFA92 (B=1975)
Unisex annuity rates	50% of PMA92 (B=1975) + 50% of PFA92 (B=1975)[49]
Profit loading on annuities	5%

The economic assumptions used are in line with Personal Investment Authority (PIA) guidelines for future projections.

G.3 Stochastic projections

Increase in RPI	2.5% pa

Pre-retirement investment returns in excess of RPI:

Mean	4.5% pa
Standard deviation[50] (up to last 5 years)	15.94% pa
Standard deviation (last 5 years)	12.3% pa

The mean return is consistent with the real return on investments assumed in the deterministic projections. The standard deviation prior to the last 5 years is consistent with the historical standard deviation of the annual real returns on a portfolio allocated 60% to equities and 40% to gilts[51]. The standard deviation during the last 5 years is consistent with the historical standard deviation of the annual real returns on a portfolio allocated 100% to gilts. The standard deviations used have been chosen to represent a 'lifestyling' approach to investment policy, whereby the investments are moved systematically into lower volatility fixed-interest securities in the five years approaching retirement[52].

Yield for purchasing annuity at retirement in excess of RPI:

Mean	3.5% pa
Standard deviation	0.63% pa

The mean yield is consistent with the returns assumed in the deterministic projections. The standard deviation is consistent with the historical standard deviation of the real redemption yield of a portfolio of long dated index linked gilts[53].

Earnings growth in excess of RPI	1.5% pa
Promotional increases	Nil
Career breaks	Nil
Pre-retirement expenses	1% pa of the fund
Pre-retirement mortality	No assumption needed as benefit is assumed to be a return of fund.

Post-retirement mortality:

Male annuity rates	PMA92 (B=1975)
Female annuity rates	PFA92 (B=1975)
Unisex annuity rates	50% of PMA92 (B=1975) + 50% of PFA92 (B=1975)

Profit loading on annuities	5%

The stochastically varying returns have been assumed to be drawn independently from normal distributions with the appropriate means and standard deviations (less fund management charges of 1% during the pre-retirement period). The analysis in Section 6 is based on 5000 Monte Carlo simulations.

Appendix H – Assumptions used in the Stochastic Modelling of Alternative Vehicles for Providing Income in Retirement

The main assumptions used in Section 8 are consistent with those used in Section 6.

Increase in RPI	2.5% pa
Investment returns in excess of RPI:	
Mean	4.5%
Standard Deviation	15.94%
Yield for purchasing annuity at retirement in excess of RPI	3.5% pa[54]
Yield for purchasing deferred annuity in excess of RPI	3.5% pa[55]
Expenses for funds invested substantially in equities	1% pa of the fund
Post Retirement Mortality Unisex rates	50% of PMA92 (B=1975) + 50% of PFA92 (B=1975)
Profit loading on annuities	5%
Profit loading on deferred annuities	5%

The stochastically varying returns have been assumed to be drawn independently from normal distributions with the appropriate means and standard deviations (less fund management charges of 1%).

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Endnotes

[1] So called because what is defined is the contribution rate into the plan; the pension benefit depends exclusively on the value of the fund accumulated at the age of retirement.

[2] This is specified in the Income and Corporation Taxes Act 1988; the Act requires that an annuity must be purchased by age 75 at the latest.

[3] With such schemes no fund is accumulated, instead the contributions of active members of the plan are used to pay the pensions of retired members.

[4] So called because what is defined is the pension benefit from the plan, e.g., a pension of two-thirds of final salary.
[5] Ando and Modigliani (1963).
[6] While individuals tend to smooth out their consumption expenditure over time, this does not necessarily imply that it is constant over time. A typical pattern in retirement, for example, is that consumption expenditure is relatively high just after retirement, subsequently falls, but then rises again as individuals make use of long term care in their final years.
[7] E.g., Yaari (1965) and Fischer (1973).
[8] Perfect capital markets imply that all risks can be perfectly hedged using the existing set of financial assets.
[9] See, e.g., Mirer (1994) and Poterba and Wise (1996).
[10] See, e.g., Hurd (1989) and Bernheim (1991).
[11] See, e.g., Yagi and Nishigaki (1993).
[12] See,. e.g., Warshawsky (1988) and Friedman and Warshawsky (1990).
[13]Over 30% according to some studies, e.g., Poterba and Wise (1996) and Mitchell et al. (forthcoming).
[14] By accumulated pension assets we mean the present discounted value of the promised future pension payments under these plans.
[15] See, e.g., Cherin and Hutchins (1978) and Milevsky (1998).
[16] The Inland Revenue uses two legal cases to define annuities: *Foley v Fletcher* (1858): 'an income is purchased – the capital is gone – the principal having been converted into an annuity'; *Perrin v Dickson* (1929): 'an annuity means you spend your capital in buying an income'.
[17] DTI Returns for 1997.
[18] MacDonald (1996).
[19] Finkelstein and Poterba (1999).
[20] Credit Suisse First Boston (1999).
[21] Adrian Waddingham of consulting actuaries Barnett Waddingham argues that: 'We don't think drawdown is suitable for clients with less than £300,000 in their retirement pot. Although you wouldn't recommend it to the man in the street, it might be viable for a person with £300,000 who has other investments' (quoted in *Pensions Management*, December 1999, p. 29)
[22] However, this does depend on there being an adequate supply of both fixed-income and index-linked bonds to back up the relevant annuity payments. If there is a relative shortage of one type of bond, annuity providers will only be able to acquire it by bidding up its price, so a smaller annuity will result and the equivalence of values will no longer hold.
[23] The government itself is considering the introduction of a 'flexible decade of retirement' between 60 and 70 as reported by Prescott (1999).
[24] A step-down annuity is therefore equivalent to the combination of a life annuity that pays the RIR for life and a temporary annuity that pays the difference between the MRI and the RIR between the Start Age and State Pension Age.
[25] For evidence of this refer to Table 10 of Willets (1999) which indicates that in the1990s male mortality has improved faster than female mortality for all age groups over age 30.
[26] Derived as follows: 20% of the difference between national average earnings (£400 per week) and the LEL (£67 per week) is about £70. Adding the BSP to this and rounding to the nearest £10 gives £140.
[27] Derived as follows: two-thirds of final pensionable earnings (about 80% of £400 per week) adjusted for 6-7 job changes in a lifetime (scaling factor of 0.7 (see Blake and Orszag (1997)) implies a pension at retirement of around £150 per week (i.e., 0.7 x 0.66 x 0.8 x £400). Adding the BSP to this and rounding to the nearest £10 gives £220.
[28] This was suggested to us by Tom Boardman.
[29] It is important for the sake of an exact comparison that the same income is withdrawn as with an annuity, even though the income drawdown rules allow some flexibility over how much is withdrawn.
[30] The standards for charges-access-terms that have been applied to Independent Savings Accounts (ISAs) and Stakeholder Pension Plans.

[31] This symmetry in the declared bonus rate matches the symmetry of the underlying returns distribution and so in the long run will be self financing and thereby avoid the need for the insurance company to draw on reserves.
[32] This remark must, however, be tempered by two real world practicalities. First, immunisation strategies are expensive and the costs have to be included in the annuity price. Second, there may be an insufficient supply of financial instruments to undertake immunisation strategies. Immunisation is explained in detail in Blake (2000, section 14.3.2).
[33] See also Mantel (1999) who examines the consequences of the increasing funding of pension provision in Europe.
[34] The Institute and Faculty of Actuaries is currently undertaking a review of MFR arrangements; it is expected that they will recommend that the yield on corporate bonds can be used in place of the yield on gilts in MFR calculations.
[35] Under the Maastricht Treaty, the PSBR cannot exceed 3% of GDP, while the National Debt cannot exceed 60% of GDP.
[36] SERPS is being replaced by an ultimately flat-rate State Second Pension beginning in April 2002 following the introduction of the Welfare Reform and Pensions Act 1999.
[37] This section draws on Blake (1999).
[38] Teachers Insurance and Annuity Association of America – College Retirement Equity Fund.
[39] March (1996).
[40] Protected Rights is the name given to the component of a personal pension plan that has been used to contract out of the State Earnings Related Pension Scheme and into which the National Insurance rebates are invested.
[41] This section draws on Mitchell et al (forthcoming), Poterba J. M. (1997), Prudential (1999), Quicken (1999), Senate Committee (1999), Social Security (1999).
[42] This section draws on Congressional Budget Office (1999), Commonwealth Department of Family and Community Services (1999), Hindle (1999) and OECD (1999).
[43] This section draws on Canada Life (1999), Pensions Board (1998) and Revenue Commissioners (1999).
[44] This section draws on Congressional Budget Office (1999).
[45] This section draws on Asher (1999), Central Provident Fund (1999) and William Mercer (1999).
[46] This section draws on a contribution from Tim Reay.
[47] National Mutual Life (1996).
[48] PMA92 and PFA92 are standard tables of mortality which have been compiled by the Continuous Mortality Investigation Bureau of the Institute of Actuaries and the Faculty of Actuaries. The tables refer to males and females respectively. The tables were derived from the mortality experience of life office pensioners in the period 1991 to 1994. The tables have been adjusted to allow for expected future improvements in mortality. The notation (B=1975) denotes that the version of the tables used is applicable to individuals born in 1975.
[49] This weighting anticipates the eventual convergence of male and female participation in the workforce.
[50] The standard deviation measures the dispersion of investment returns about the mean return. In a given year, there is approximately a 1-in-6 chance that the actual investment return will be larger than one standard deviation above the mean return, and approximately a 1-in-6 chance that the actual investment return will be smaller than one standard deviation below the mean return.
[51] Credit Suisse First Boston (1999).
[52] While lifestyling would normally lead to a reduction in the expected return on the investments as well as in their risk, we have chosen to maintain a constant expected return as required by PIA guidelines.
[53] DataSTREAM.
[54] Assumed to be deterministic.
[55] Assumed to be deterministic.